THE

SURGICAL CLINICS

OF

CHICAGO

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CONTENTS

CLINIC OF DR. ALBERT J. OCHSNER

Augustana Hospital

CRANIOTOMY FOR 'JACKSONIAN EPILEPSY

Summary History and physical examination of a case presenting many of the characteristics typical of post-traumatic Jacksonian epilepsy, anesthesia for head cases, discovery of subdural cyst—management by transplantation of fat and fascia, importance of a salt-free diet in conjunction with bromid medication after operation

HISTORY

THE patient, a Servian boy of twenty-one years, was admitted to the hospital September 17, 1916, because of epileptic seizures.

His family history is negative. He was never sick before. He denies venereal infection. He has been in this country three years. He is not married.

Five years ago, during an altercation with a fellow workman, the patient was struck on the left side of the head with the sharp edge of an ax, causing a fracture of the bone. He was rendered unconscious immediately and remained so for about one-half hour. He then tried to get up and walk, but found that he was paralyzed on the entire right side and could not talk. He could hear well and remembers everything since then. Several pieces of bone were removed by a doctor at that time and the wound was closed. He remained in bed five weeks, during which time he could not talk nor use the entire right side. The paralysis and the speech gradually improved, but he has always been somewhat weaker on the right side.

Six months ago he had the first attack of ringing in the ears, severe pain in the right arm and right leg, followed immediately by unconsciousness, lasting eight minutes. He recovered quickly and walked home. One month later he had an

not necessary to apply any additional anesthetic throughout the course of the operation.

We shall first elevate the head, as in the goiter operation, in order to reduce the blood-supply of the head to a minimum. After shaving the head and preparing the field aseptically, as you see, I shall surround the operated area with these Cushing pins so as to control the hemorrhage as much as possible. We will make our horseshoe-shaped incision larger than the old incision, so that we will have a sufficient amount of space. Cushing has pointed out the great importance of controlling the hemorrhage in all operations on the head, and for that reason we have made pressure with these Cushing needles. The few points of oozing which appear in our incision are caught with mouse-tooth forceps.

I have cut down to the periosteum, making this large skin-flap. You see I made this flap considerably larger than the bone-flap which I shall make. The object is to have the suture line of the skin-flap at a distance from the edge of the bone, so as to prevent adhesions to the skin Now here, you see, in loosening this skin-flap I have encountered above the former wound in the bone a cyst with a considerable amount of fluid, showing that there exists a pocket of fluid between the scar-tissue and the brain This cyst alone would be sufficient to cause recurrence of the epileptic seizures. What we have found so far will account for the occurrence of the epileptic attacks, but, of course, we must explore further You will note that this cyst is still discharging I shall now loosen the adherent periosteum carefully and then use this knawing forceps to enlarge the bony opening in order to ensure a satisfactory decompression. The bone here is very hard. You have observed from the history the fact that the ophthalmoscopic examination showed the presence of increased intracranial pressure.

Now, I have reached beyond the point at which the dura is adherent below. I shall try and loosen the remaining adhesions that exist. This bone is unusually hard, so that it is almost impossible to cut it away with this forceps. Just at this moment I severed a branch of the posterior meningeal artery. This

gives a little flow of blood. We will tampon with gauze to control it. I am extremely careful to leave no rough edges about this opening in order to have no irritation of the cortex. I have followed the edge all the way around. Wherever I find a little sharp edge I cut it away with forceps. Now this mass ·beneath the dura feels exactly like a cyst. It has a very sharp, definite outline. I must be extremely careful not to cause any irritation by rough manipulations. It is apparent that we have here quite a large organized blood-clot. The connective tissue which has formed in the area of this blood-clot is adherent to the cortex. The quantity of connective tissue has made the approach to this portion of the tissues overlying the brain very difficult, and is undoubtedly sufficient in quantity to cause the irritation which is necessary to bring about the attacks of Jacksonian epilepsy.

We now have two plans of procedure that we may follow. One plan would consist in cutting away this organized clot, necessarily removing with it a small thin layer of brain tissue. That may overcome the convulsions, but it may at the same time cause a certain amount of paresis of the right arm and leg, because this blood-clot is localized over the motor area which supplies those extremities. The second plan is the one which we shall follow, and consists in placing over this entire area a piece of fascia lata containing quite a considerable amount of fat, with the fat directed downward. This is done in the hope of preventing the development of fresh adhesions or the re-formation of the cyst, so that the patient may be given complete and permanent relief. You observe that the fascia-flap that my assistant has made is exactly large enough to cover this entire space, and that it extends underneath the edge of the bone for a distance of $\frac{1}{2}$ to 1 cm., which is quite sufficient to hold it in place. I have adjusted the flap and carried the edge of it underneath the edge of the bone throughout, so that I have no doubt that it will stay in place. Now the question is whether we had not better place a very fine catgut suture in this flap. Of course, in sewing this in place we must be extremely careful not to do anything that might possibly traumatize the under-

Line of incision
Cushing pins in place

Exposure of
previous trephine
opening

2

Cyst

Separating dura
from skull

3

Periosteal
elevator

4

Appearance of
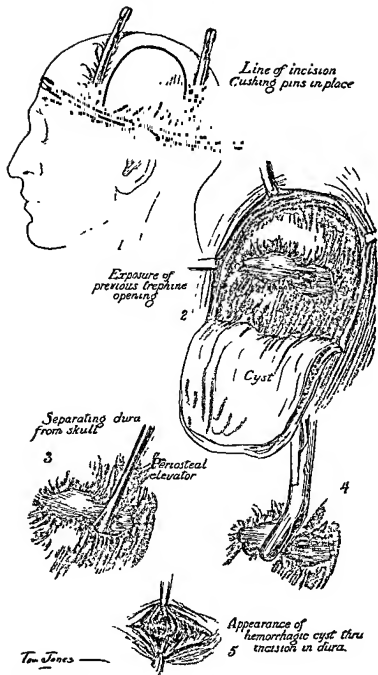hemorrhagic cyst thru
incision in dura

5

Tom Jones

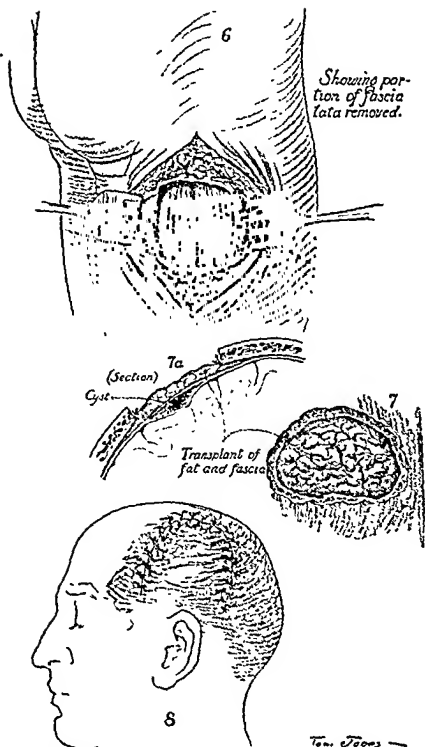Fig 254, 1-5.—Hemorrhagic brain cyst. Fat and fascia transplantation into defect.

Fig. 255, 6-8.—Hemorrhagic brain cyst. Fat and fascia transplantation into defect.

lying dura, which might in the future become a focus of irritation. You see with what care the assistant brings the needle through without causing any traumatism. Now we suture the scalp wound. You see the scalp wound is quite a distance back from the wound in the bone, so that the scar from the scalp wound cannot reach down to the brain and cause irritation. (See Figs. 254, 1–5; 255, 6–8.)

Within a month Dr. Dercum, of Philadelphia, has had an article in the Journal of the American Medical Association in which he described the medical treatment for these cases, and in which he states that he believes that the irritation is reduced by giving these patients a salt-free diet and a small amount of sodium bromid and a very small amount of thyroid extract. *In all the patients that we have operated on for this condition* for a number of years we have followed this plan after the operation. They are given written directions to the effect that they are to be moderate in their exercise, that they must keep out of the hot sun in summer, that they must never become exhausted, that they must eat a very small amount of meat only, not more than a little meat two or three times a week, and that they must eat almost a salt-free diet   In place of table salt I instruct them to use a small quantity of sodium bromid to season such articles of food, as eggs, for instance, which may be repugnant to them without salt. Since we have instituted this very strict régime following the operation our results have been very much better than when we depended on the operation alone for relief. *That is what we will do with this boy. We will see that he gets* suitable work, such as farm work, where he does not have to work too hard. We will see that he does not get salt in his food, that he eats but a very small amount of meat, that he does not get exhausted or excited, goes to bed early, has his bowels in good condition, and that he never eats a large meal. Such is the plan by means of which we hope to insure to our patient lasting benefit.

TUMOR IN UNDESCENDED TESTICLE

HISTORY

THE patient, a single man of thirty-six years, a letter-carrier by occupation, was admitted to the hospital February 27, 1917, complaining of headache, vomiting, and constipation.

His family and past histories are negative. The present trouble began last October after eating some pork and beans, when he felt sick and vomited all one night. Since then he has had intermittent attacks which have increased lately, and now he says they start with a burning headache, and later he becomes nauseated and vomits. The vomiting seems to be projectile in nature. It is very sour. He says his stomach bloats up and he begins to belch gas. At times this is relieved by the taking of food. The epigastric distress comes on soon after eating. Bowels are constipated. Lately, he has passed some blood in the stools. He thinks he has an undescended testicle, and at times this pains him. He wears a truss for support. He has lost no weight. Does not sleep well at night. He has dull burning headaches generally in the sides of the head. He drinks one or two bottles of beer a day, otherwise his habits are negative.

EXAMINATION

Physical examination shows a well-developed and poorly nourished man. The eyes react to light. The sclerae have a slight yellow tint. Head, neck, lungs, and heart are negative The skin has a brownish tint. The abdomen is somewhat pendulous. In the right lower quadrant is a hard, smooth, firm mass, about the size of a four- or five-months' pregnant uterus. This is fixed and not painful. Rectal examination shows an enlarged prostate and a tumor mass near the sacrum. There is a mass in the left groin over the inguinal canal. It is not reducible.

COMMENTS AND OPERATION

Dr Ochsner (February 28, 1917): This tumor is located opposite the internal abdominal ring. It is covered through-
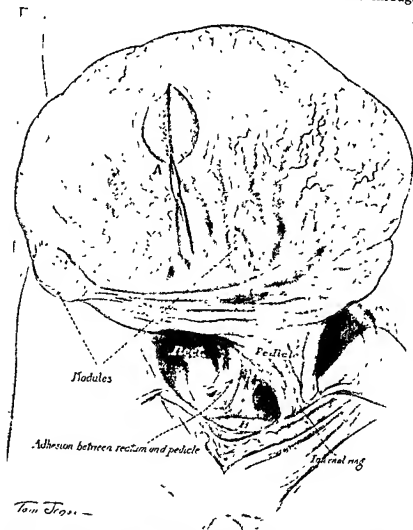

Fig 256 —Huge tumor of intra-abdominal ectopic testicle delivered through mid-line incision

out with peritoneum and is perfectly smooth on its external surface. It is attached to the abdominal wall by means of a

piece of the spermatic cord containing the vas deferens and all the blood-vessels and a fold of peritoneum (Fig. 256). The pedicle is about 5 cm. in diameter. We have grasped it with hemostatic forceps precisely as we would grasp the pedicle of an ovarian cyst. The sigmoid flexure of the colon is attached opposite the edge of the pedicle. This attachment we are going to sever, and then carefully unite the peritoneal edges with silk suture, in order that we may not leave any raw surfaces. For the same reason we will also turn in the stump of the pedicle with a few fine silk sutures. The pedicle we have ligated by transfixing with catgut sutures and tying in sections in order that there may be no possibility of slipping, because the vessels of the spermatic cord which have supported the growth of this tumor are considerably enlarged.

There seems to be some evidence that malignant growths are more likely to occur in undescended testicle than in the case of the organ in its normal position. The most common form of malignant growth is sarcoma, but all forms of malignant growths are found in this organ. Carcinoma is next to sarcoma in frequency, and then comes the malignant growth known as teratoma, which may contain several or all forms of tissue, epithelium, glandular tissue, nerve, fat, muscle, and bone.

Unfortunately, in this patient there is secondary involvement of the left kidney which has a large mass in the lower pole. The liver is free from malignant growth. The lymph-nodes in the left inguinal canal are apparently enlarged, and upon looking further we find a distinct tumor mass in the inguinal canal which fills the canal throughout its course to the upper end of the scrotum. This mass has the appearance of an obliterated hernial sac which has become filled with blood, and which I think also contains malignant tissue. We find no difficulty in enucleating this sac and grasping the blood-vessels in the canal and ligating them. Having removed the sac, we ligate the vessels and close the inguinal canal with a catgut suture.
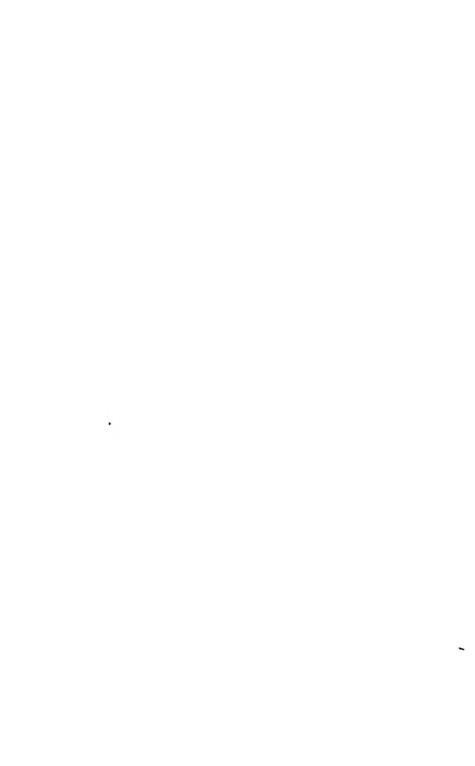
CLINIC OF DR. ARTHUR DEAN BEVAN

PRESBYTERIAN HOSPITAL

THE TECHNIC OF COLOSTOMY

Summary: A patient with marked stenosis of the entire colon as the result of an inflammatory process of unknown etiology; indications for colostomy; the technic in detail, after-treatment.

I DESIRE to operate on a very interesting case, which gives the following history:

A woman of thirty-five has had for the last four or five years a great deal of difficulty with the rectum and colon. She has been treated for stricture of the rectum. The exact etiology of this stricture is not clear, but with the finger and with the bougie one can find a definite obstruction about 2 inches from the sphincter, and it has been necessary to keep this dilated for several years. In addition, she has had great colon distress associated with periods of diarrhea and a good deal of mucus, and sometimes symptoms suggestive of a beginning obstruction, although never with a complete obstruction.

The x-ray picture of the colon injected with barium shows, as you see in this plate, a very unusual and singular condition, a very greatly constricted colon with a little dilatation at the cecum, although the cecum is much less contracted than the rest of the colon.

After studying this case very carefully it has been determined to do an exploratory operation and find out the exact condition of the colon and see what can be done in an operative way to relieve it. Before doing the exploratory I want to say that our clinical diagnosis is that of a long-standing inflammation of the colon of unknown origin. No evidence of tuberculosis or amebiasis has been found. This long-standing inflam-

mation has resulted in a great contraction of the colon and a clinical picture of diarrhea with mucus and sometimes blood. My conception is that the best thing that can be done for this woman to afford her relief is a colostomy made at the cecum, with the idea of placing the entire colon at rest for a number of months. This rest may lead to a cure of the chronic inflammatory process, and it is possible that later we may be able to close the colostomy wound I want to take the opportunity in this case to show you the technic of colostomy which we have developed in this clinic, which is very simple and which has proved to be very effective.

TECHNIC OF OPERATION

Under ether anesthesia you see that I make a muscle-splitting incision very much the same as the muscle-splitting incision employed in an appendectomy. Through this muscle-splitting incision I introduce my hand and find a most interesting condition as far as the large bowel is concerned. I can trace it out from the cecum along the ascending colon, transverse colon, and descending colon and sigmoid not as a normal large intestine, but as a quite small, contracted bowel, certainly not more than one-third the size of a normal colon and with very hard, stiff, rigid walls, showing that there is a tendency to produce an almost continuous stricture of the large bowel from the cecum to the anus. I cannot say whether this has been due to a tuberculous process, to an amebic infection, to a gonorrheal infection, which sometimes produces a stricture of the rectum, or to some ulcerative process from an unrecognized organism. The condition, however, is certainly unusual, and the changes are so great that I doubt very much whether there is much possibility of the bowel ever returning to anything like a normal condition even after prolonged rest.

Opening the peritoneum I draw out the cecum, which has a short mesentery in this case (Fig. 257, a). I then take, as you see, a large needle with good-sized silk thread, and tie this so as to make a double ligature. I pass the needle through one side of the incision and then through the mesentery of the cecum

and then out at the other side of the cecum, as you see in Fig. 257, *a* and *b*. A small piece of iodoform gauze is put in the loop of the thread. The opposite loop is cut with a pair of scis-

gauze placed in loop
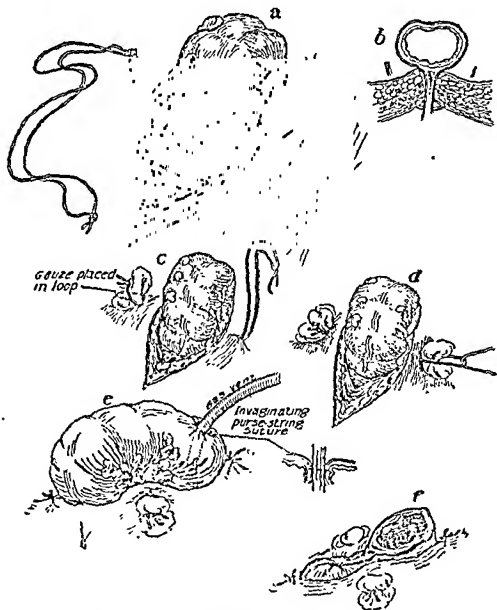
Invaginating purse string suture

Fig. 257.—Technic of colostomy   (Described in detail in text.)

sors at the middle, and another piece of iodoform gauze is placed that side of the incision and the thread tied as in Fig. 257, *c* and *d*. This holds the loop of large intestine well out of the wound.

Now this intestine should not be opened at this sitting. At the same time, in order to relieve the gas-pains and make the patient more comfortable, we always introduce a rubber catheter, about a No. 12, through a small puncture in the proximal end of the intestine, and hold this in place, so that there can be no possibility of leakage, by a purse-string suture (Fig. 257, *e*). Now, I put in two silkworm-gut sutures at each end of the muscle-splitting incision, and this completes the operation. You see how rapidly a colostomy of this kind can be made, and I can assure you that the addition of the rubber catheter securing immediate relief from gas pressure has proved to be a most gratifying improvement. An operation of this kind can, of course, be made under local anesthesia without any difficulty, but in this particular case it was desirable to use ether because I wanted to explore the abdomen thoroughly.

At the end of three days I shall take a cautery and cut out, with the cautery, the rubber tube and enlarge the opening. In this particular case I shall close the distal opening in the cecum, so as to make it impossible for any intestinal contents to pass into the colon beyond the point of the colostomy, as it is distinctly our desire to put that entire segment of intestine at rest. I shall do that, as is well represented in the chart which I show you (Fig. 257, *f*). I shall completely divide the bowel, and this can be done without any anesthetic or, at best, with a little local anesthesia. The distal end of the intestine will be closed by two rows of sutures, one including the mucosa and all the coats of the bowel, and one through the muscularis and peritoneum. I use purse-string sutures in doing this, and secure a certain amount of invagination so as to ensure a perfect closure.

These patients learn to handle their colostomy openings very well by means of specially made cups and dressings, and by educating themselves to have one or two bowel movements a day through the inguinal anus. I have a large number of patients now, especially cases with carcinoma and some from benign obstruction, such as the case under consideration, and cases of diverticulitis requiring an artificial anus, who have learned to make themselves very comfortable and are very

happy in spite of the artificial opening. I particularly want to emphasize the points of technic in this method of colostomy, its simplicity, its safety, and the great freedom from distress afforded by the safety-valve action of the catheter.

Postscript.—The later history shows an uninterrupted recovery from the operation and great relief from the former symptoms and a very rapid increase in weight and strength. On account of the very great changes in the intestine, however, it is not considered wise to close the colostomy wound. Possibly at the end of six months or a year, if we can demonstrate by barium injections that there has been marked improvement and return to anything resembling a normal condition of the intestine, and if we can improve very materially the condition of the stricture of the rectum by dilatation, we might consider a closure of the colostomy, but from our present point of view that seems improbable, and I am inclined to think the best plan is for the patient to be satisfied the rest of her life with a permanent colostomy opening.

PROLAPSE OF RECTUM: TECHNIC OF REHN-DE LORME OPERATION UNDER LOCAL ANESTHESIA

THE next lesion in the patient I desire to show you involves the rectum and not the colon. This is an example of the great value of the Rehn-De Lorme operation for very extensive rectal prolapse. The history is as follows:

Patient, Mrs. E. A., age forty-three.

History.—Seven or eight years ago the patient noticed a slight protrusion of the rectum at the time of bowel movements. This trouble has gradually grown worse until now a prolapse occurs with every movement and after any lifting or straining Although the protrusion has been very marked of late there has been no bleeding and no difficulty in replacing the bowel There has never been much pain There is no history of constipation Her general health has always been good, with no history of previous illness. She has had one miscarriage and no other pregnancies

Physical examination reveals a large-boned, very thin woman. Further examination is entirely negative except in regard to her rectal condition On bearing down there is a large prolapse of an indeterminate amount of the bowel, probably 3 inches of mucosa becoming visible on continued straining—*i e.,* a prolapse of 5 to 6 inches of mucosa.

Operation —After infiltration with novocain and adrenalin (1 : 100,000) of the space between the mucosa and muscularis, a circular incision is made at the mucocutaneous junction. The fibers of the external sphincter, which are widely separated, are brought well into view. The sphincter is now reefed with a row of interrupted catgut sutures for a distance of 2 inches. A second row of sutures reefs the internal sphincter for about 3 inches. About 5 inches of the mucosa is carefully dissected back and amputated. The mucous membrane is then brought down and
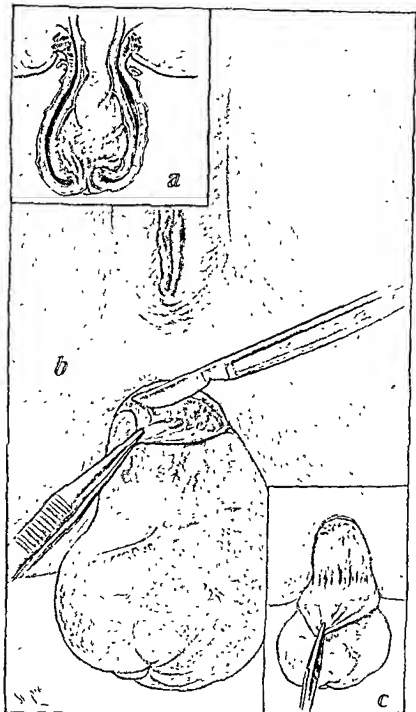
Fig 258 —*a*, Longitudinal section of prolapse to show its components, *b* and *c*, appearance of prolapse, incision, and dissection of mucous membrane
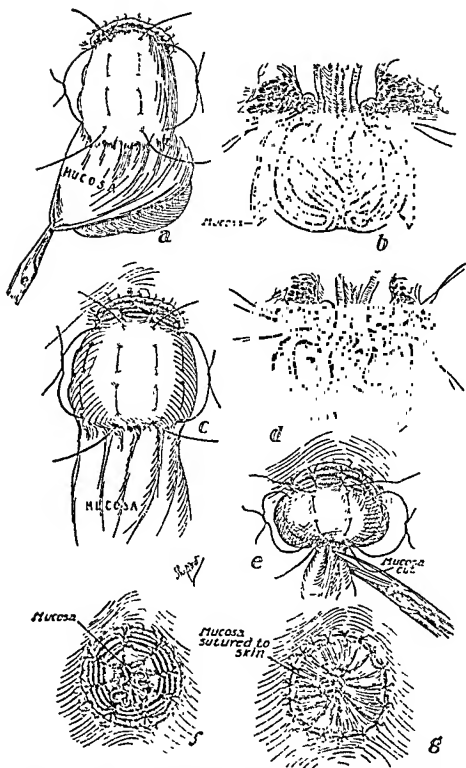
Fig. 259.—Serial diagrams of Rehn-De Lorme operation as described in text.

sewed to the skin with mattress sutures of black silk. This is known as the Rehn-De Lorme operation.

From the limited experience which I have had with this operation it has impressed me as being much the best procedure in these cases of rectal prolapse where we have these great masses of all the coats of the rectum coming down for a distance of 5, 6, or 8 inches, and producing great discomfort and generally incapacitating the patients. The Rehn-De Lorme operation can be done so well under local anesthesia, and it carries with it so little risk, and, as is demonstrated in this patient, it gives, with this reduplication of the musculature of the bowel, a sphincter amputation of the prolapsed mucosa, such an ideal result, that I think we must regard it as the best method that has so far been suggested to handle this distressing lesion.

CLINIC OF DR. KELLOGG SPEED

COOK COUNTY HOSPITAL

DEMONSTRATION OF CASES BEFORE THE CHICAGO SURGICAL SOCIETY, MAY 4, 1917

Summary: I. Carcinoma of the lower lip—removal of tumor with plastic repair of defect; lymphatics of the lower lip—their surgical importance.

II. Decompression for the relief of traumatic epilepsy. Technic of the operation—transplantation of fascia lata; relation between head injuries and epilepsy as indicated by reports from and personal experience in the war hospitals, importance of bromids and lumbar puncture in treatment of head injuries.

III. Decompression for hypophyseal tumor. Diagnosis of tumors in the region of the sella turcica; indications for operation; subtemporal decompression—the problem of hemostasis—steps of the operation; result in present case two weeks after operation.

IV. Occipital decompression for increased intracranial tension, supposedly the result of an old depressed fracture of the skull, blindness and headaches the chief indications for operation.

V. Perforated gastric ulcer. Diagnosis—tendency to confuse late cases with acute appendicitis; value of methylene-blue in locating point of rupture; closure of perforation and drainage the two cardinal points in treatment.

I. CARCINOMA OF THE LOWER LIP

THIS man had a carcinoma of the lower lip. Here is a slide which shows it beautifully. We are always on the trail of cancer and have not yet caught up to the rear guard. How do we know? Marshall[1] found in his State (Wisconsin) that in 1908, 1513 persons were afflicted with carcinoma, whereas in 1913 there were 1755 instances. A natural increase in population accounts for some of this increase, but according to the vital statistics of the United States Government in the period from 1908 to 1913, corresponding to the aforementioned, the increase of cancer death per 100,000 population was from 71.5 to 78.9.

[1] Wis. Med. Jour., xiv, No. 12.

Recently Bloodgood[1] has analyzed the lip carcinomata, selecting patients who have *lived five years or more since operation*. They can be divided into three groups:

Group One: V-shaped removal; 63 per cent. cured.

Group Two: V-shaped removal plus glands which did not show carcinomatous involvement; 95 per cent. cured.

Group Three: V-shaped removal plus glands which *did* show carcinomatous involvement; 50 per cent. cured.

May we compare this with breast cancer, in which the best statistics show us that even when the axillary glands are not infected with the malignant process, the cures are only 80 per cent. after radical operation, while infected axillary glands promise only 20 to 40 per cent. cure after the same procedure.

From the clinical standpoint we must remember the glands and lymphatic vessels which are intimately connected with lip cancer. In order of their involvement they are the submental, submaxillary, and deep cervical glands—the last of which may not show evident involvement for years after evidence of the lip sore. Rather more interesting are the lymphatic vessels draining the lip. They are composed of two groups, the submucous and subcutaneous, and have intense significance in clinical study. The *submucous* lymphatics pass to the submental and submaxillary glands *on the same side*. The subcutaneous lymphatics, however, *pass across* to the glands of the opposite side and intercommunicate. Of what importance is this clinically? Simply this, that if the cancer involves the skin surface of the lip beyond the mucocutaneous margin, one *must* remove the glands on both sides. If the mucous surface alone were cancerous, and the lesion were distinctly unilateral, removal of glands on one side might be ample, but it is wiser to remove both

The causes of recurrence after operation may be stipulated then as: first, too late intervention; second, incomplete surgery both of the actual lesion and its lymphatic drainage.

The reason I show you this patient is to demonstrate the plastic method of removing the carcinoma and repairing the face, for the most radical operation is always the one of choice

[1] Surg., Gyn. and Obst., 1914.

before cervical gland involvement. It is now ten days since the operation was performed. He has already a fairly respectable looking mouth and lower lip (Fig. 260). He has also a restoration of the mucous membrane across the lip and a complete healing of the lip in the midline. The incision through which the glands were removed from the submaxillary region has practically healed.

Fig. 260—Case I· Photograph of patient ten days after operation.

A word about the technic of the operation. To obtain a closure of the lip after a resection of a large portion of it, it is desirable to make a plastic which does not have tension on the flaps You see he has a fairly pliable loose lower lip. He can open his mouth widely and there has been no tension on the scar. We must consider first a method of incision for the removal of tumor masses. We make a V-shaped incision, going

Nicholas Senn, but that seems improbable, as I believe Dr. Senn has been dead more than eight years. At any rate, at that time he had a depressed fracture which was relieved in part. The skiagram which you see here shows now more or less defect in the frontal bone. The epileptic seizures, to go very briefly into the history, are mostly at night, the fits coming on when he is asleep. He awakens to find the pillow covered by blood. The last attack occurred on the street, and he was picked up and brought to the hospital   The Wassermann is negative. There is nothing of any importance in the physical findings. There are no pareses nor paralyses, nothing to show any involvement of more than the cortical area.

In the technic of opening these head cases we try to be very simple. A tourniquet is placed on the scalp outside of a sterile towel. In this case today it does not work very well because the rubber broke just as we were putting it on   In opening a skull with that kind of technic one has no difficulty with scalp bleeding, which is otherwise always bothersome. I want to open this not directly over the site of the present depression and probable adherence to the cortical surface, but to one side. Also I must avoid the sinuses   I pick a point here where it is safe and begin to open the skull. On account of the character of the pathology, we will not use a mechanical saw, as we do not know how extensive the adhesions are. It is, therefore, better to use the hand trephine. This man is colored and, like all colored men, has a reasonably thick skull. My bone button is loose and can be lifted out with the trephine   As one progresses with the trephine it is wise to sound the depth of the cut with the blunt end of a needle, to make sure that the dura is not being injured. The first valuable sign as the trephine sinks in is the appearance of the blood as the diploëtic vessels are opened. However, some skulls have little or no diploë and this finding may be lacking. An experienced hand can use the hand trephine and completely loosen the button and then lift it out with the trephine, as I have done here, without endangering the dura, so keen does the sense of resistance to the instrument become after performing repeated craniotomies. Now with the De Vilbiss we

can drill around this depressed portion. I want to find a place for an opening where the dura is not adherent both to the cortex and to the temporal bone. The operation is both for a decompression and relief of the cortical adhesions. I find that there are some adhesions between the pericranium and dura as it comes down along the edge of the skull. That must be stripped off without interfering with the cortex. The dura has remarkable powers of regeneration. After we open it for a decompression we find it grows over, no matter how widely it is slit up, grows over very rapidly, and covers almost any defect in a very short time. If you have occasion to open a craniotomy within a short time after the original operation you will find this to be true.

We are going to make a fascia lata transplantation here. Dr. Andrews has very kindly taken out the fascia transplant that we are going to use. We expose the cortex and then take this flap of fascia and place the fat side down toward the brain, and in this way we hope to avoid subsequent adhesions. I say hope, because it is a hope, but it works quite successfully in most cases. Whether it is wise to trim the cortex in the involved motor area or not is a disputed point. I have operated on several of these, and I have never trimmed off the cortex, and some of them have been successful.

I might say a word to you about the administration of bromids in head cases. In traumata to the head where there is a cortical laceration, even if it is only slight, or even where a fracture is suspected or proved, it is far better to start the patient very quickly on bromids—30 grains four times a day is sufficient dosage. In connection with the bromid treatment let me also urge upon you the great therapeutic value of repeated lumbar puncture. Besides relieving the intraspinal pressure temporarily, at least with a diminution of cortical edema, it has another purpose. If there is a basilar fracture with bloody cerebrospinal fluid, the hemoglobin contained in this fluid is a distinct cerebral irritant, and the withdrawal of bloody cerebrospinal fluid lessens the danger of epileptic results from that source. In war surgery that is considered quite important, although the complication of epilepsy following gunshot frac-

tures of the brain and skull is really rare, much rarer than we think. The English Government has gone into that point rather carefully, and analyzed some 1200 to 1500 cases with that point in view, and they found that the number of men developing epilepsy following head injuries was only 4 or 5 and sometimes 6 per cent. They were all amenable to cure or control by the early starting of bromids, so patients who show any tendency to epilepsy should be put on bromids as soon as they get into the hands of the medical officer, and then they do not develop *the epileptic habit.* The bromids do not need to be kept up indefinitely, simply while the patient is having convulsions and for about three weeks thereafter in diminishing doses.

I am pulling up these sutures which I put into the dura without puncturing it completely   I am now through onto the cortex   I am going to trim away some of this dura. Beneath it is found the cortex which I do not care to injure. It is not wise to sponge the cortex under any circumstances if one can avoid it. We have now the bony edge, part of which I will take off with this forceps. I do not find any adhesions between the cortex and the dura, which bulges slightly. I am going to free some of that bone below further into the temporal fossa. The brain rises and falls with respiration, but does not seem to pulsate. We will wash this blood off with normal salt solution so we can see what we are doing. There is some dural and diploëtic hemorrhage, which, of course, the scalp tourniquet will not control. Perhaps when we get it clean we will see it pulsate That cortex is not adherent, as we have been able to demonstrate. I can pass my director completely under the dural edge. Here is some old thickened dura and pericranium. That is where the pericranium has come down over the edge of the bone and grown to the dura. Although this pericranium has grown down and is adherent, when we opened the dura we failed to find any adherence to the cortex I do see some edematous cortex, but nothing of any gross pathologic importance as far as I am able to tell

We will take this flap of fascia lata and put the fat side down. I am going to tack it there slightly under the edge of the open

bone. It acts in two ways. It will act as a hemostatic to control what little hemorrhage we are getting from the diploë and as a means of preventing the formation of adhesions. It is not necessary to suture it all around. The operation has provided a relief of pressure, a relief of bone and dural pressure, by the removal of the old adherent pericranium and dura and the application of the fascia-flap over the denuded area. The scalp will be sutured over the opening without any drainage.

III. DECOMPRESSION FOR HYPOPHYSEAL TUMOR

You just saw me operate on a patient for cerebral decompression. I have another one at whom I would like to have you look. This man came in with a diagnosis of hypophyseal tumor. To arrive at any diagnostic conclusion we must consider the following points in his history: Prior to four months ago he was well, then his eyes became weakened, his vision was blurred, and a few weeks later intense headaches, usually occipital, developed. These headaches were continuous. He began to see double, and laying all the disturbance to his eyes, he had glasses fitted, with some relief of the headache but none of the diplopia. At times he experienced a sudden desire to urinate, and occasionally lost some of the urine involuntarily. Also in severe attacks of headache he would vomit. His venereal history revealed a chancre twenty years ago. Examination showed a slight ptosis of the right upper eyelid, right oculo-motor and fourth-nerve paralysis, the muscles of the left eye being normal. The pupils, although regular, reacted very sluggishly to light and not at all to accommodation.

Dr. Brown's report on April 9th states that for the last six days the right upper eyelid has almost completely lost its power of elevation, the left retaining about one-half power. All the extrinsic muscles of both eyes were paralyzed except the right abducens and the right and left superior oblique, so that wheel motion inward is preserved. *The right visual field is typically gone in the temporal half for form, white and red. No essential changes in the nerve head.*

A roentgenogram on March 19th showed no distinct evi-

dence of brain tumor, although there was loss of the usual
clear detail in the region of the sella turcica, probably pathologic.
A later exposure (April 10th) showed the sella turcica much
eroded, particularly in its posterior portion, and there was dis-
tinct indication of pituitary tumor.

The headache, optic atrophy, bilateral hemianopsia, roent-
genologic changes in the region of the sella, and the threatened
blindness indicated surgical decompression at least. He had
been on vigorous antispecific treatment for some time with no
benefit. Clinically, he had evidence of paralysis of the right
third and fourth cranial nerves, sixth left cranial, with the cor-
neal reflex gone on the right side. The fifth nerves were evi-
dently not involved. Hearing was equal on both sides and deep
tendon reflexes normal.

The skiagrams were not positive by any means, but by close
study of them, after taking several pictures, we were inclined to
think that the hypophyseal disturbance was causing the in-
creased intracranial tension. His headaches were very bad,
and before we could attempt removal of the hypophyseal tumor
it was thought a general decompression was advisable to im-
prove his condition and to get him into shape for the more
serious operation.

In a *decompression of election* the best site is the temporal
region for obvious reasons. The bone is thin, the tem-
poral fascia is very accessible, and we have the advantage of
using the temporal muscle. This operation was done in ac-
cordance with the type of subtemporal decompression with which
we are all familiar, and was probably first brought out by Cush-
ing some years ago. The choice of incision in a decompression
of election is not necessarily the flap incision, such as we made
in the previous case, a typical horseshoe, but perhaps a direct
linear incision, such as you see here Through such an opening
you can do a decompression and not make a long noticeable scar.

The preparation of the patient involves the application of an
elastic ligature over the prepared scalp and a sterile towel.
Heavy rubber tubing is passed around the occiput. It may be
pushed down slightly over the lower portion of the forehead.

By bringing that down tightly over the towel one can get very efficient hemostasis. In the other case it was not good. In this case and in another one I will show you we used no hemostats on the scalp incision. By means of that ligature we can cut down about as low as the level of the external orbital protuberance. That is low enough to permit one to tie the middle meningeal artery, either its anterior or posterior branch or its main trunk. By a simple incision which is made *right through the towel*, as I did this morning, one exposes the field and keeps it sterile (Fig. 262, 1). The towel is simply retracted with the other tissues or turned down with the flap if you use the horseshoe opening. In the operation of election for decompression we prefer to go through this portion of the bone (indicating) on account of its thinness, first of all, and, second, because we have here the muscle which will act as a covering after the decompression is performed. Consequently, our incision is made with a heavy stroke, which goes through the scalp and also through the temporal muscle, and the very first cut of the knife gives one an opening something like that (indicating). Then by means of a trephine an opening is quickly made, the bony tissue is taken off, and the dura is exposed (Fig. 262, 2). When the bone is removed we may have an area something like this (indicating). There is that much bony defect. That can be as large as we wish to make it. No true decompression of the brain can be made *unless the dura is opened*. It must be split, cut away, and removed entirely. When this is done, the cortex of course not being touched and the middle meningeal not being divided, we then, instead of resuturing the dura, leave it off, and cover over the cortical bulging that occurs when there is increased intracranial tension by suturing the fibers of this split muscle just the same as we suture the abdominal muscles in a muscle-splitting operation for appendicitis (Fig. 262, 3). That gives a muscular covering over the defect. That muscular covering is better than a fascial covering because the muscle takes on strength and resistance in accordance with the amount of physiologic requirement put on it. Over this muscle we are able to close our scalp incision and get a very quick healing.
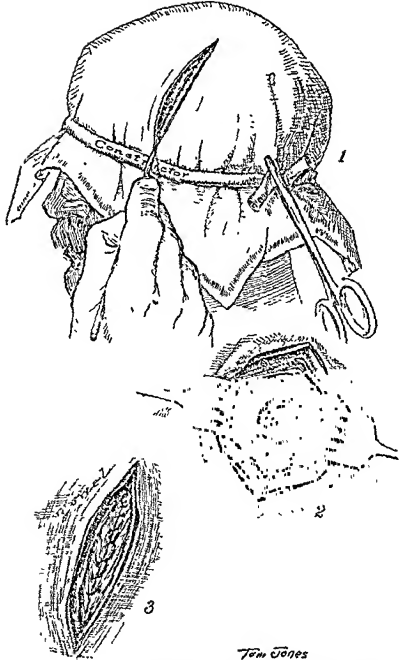
Fig. 262—Case II *1*, Mode of placing constrictor and incision through sterile towel *2*, Button of bone removed, dura exposed. *3*, Suture of incision in temporal muscle.

It is now two weeks since the operation, and you see the scalp is completely healed and here in the temporal region is the bulging cortex. One can, by close inspection, see the pulsations, and by palpation feel the denuded bone and the softened mass bulging beneath the temporal muscle. Clinically, this man has made considerable progress. His vision is not restored by any means, because one eye was quite blind. His headaches have much improved and he feels somewhat better. Possibly in the course of a few weeks his condition may warrant an attempt to remove the hypophyseal tumor either by an intracranial operation from above or a transnasal operation from below. He has none of the characteristic hypophyseal findings; no evidence of acromegaly. His jaw is not enlarged; his feet and hands are not enlarged. We also find on careful examination that his sugar retention is normal, so that the case is one of dubious diagnosis, and all that we can say definitely is that there is increased intracranial pressure with headaches and bilateral hemianopsia, which clinically seems localized from a hypophyseal origin.

IV. OCCIPITAL DECOMPRESSION FOR INCREASED INTRACRANIAL TENSION

A second brain case is of a different type. This man came into the hospital almost blind. Examination of the eyes showed that the disks were pale, somewhat edematous, but there was no true optic atrophy present. Of course, you understand that Wassermann examinations were made. One was slightly positive and two or three were negative. We have been having some trouble with our Wassermanns in the last three months. We have a great many done here, particularly on the eye and nervous disease services. Recently, I think for three or four months, we have had practically all negative Wassermanns in the eye service, so Dr. Brown has been checking them up by submitting the specimens to other laboratories. In almost every case they have been confirmed, but in this patient Dr. Nicol, of the Presbyterian Hospital Laboratory, found a positive at one time, none of the others having ever shown that

reaction. The history was that he had a severe trauma to his head in February of this year. The skiagram shows a slight depression at the junction of the parietal and occipital regions, which might be the cause of an increased intracranial pressure and ultimately cause an optic atrophy. The eye surgeon decided, on account of the immediately threatened optic atrophy, that we should investigate the condition very thoroughly. Consequently, we submitted him to a decompression.

This decompression was done in just the same way as the previous one, which I have described to you; with the same technic, except that it is in a different portion of the skull. One must bear in mind, of course, the location of the sinuses and the various important anatomic parts of the brain, but, as far as the mere bone is concerned, that type of operation fits almost every craniotomy. When we opened this skull we found at this point (indicating) the evidence of a depressed skull fracture, very slight in extent, with a dural adhesion which joined the cortex. It was over the occipital lobe, and if you observe closely you may see here the pulsation of the brain at the point where the skull has been removed. An occipital decompression was done about 1½ inches in diameter, circular in form, and the cortex was exposed and left bare. No attempt was made to put in a covering of fascia and fat, as we did in the first case, nor was the dura left sutured or even lying in approximation. As I said before, the dura regenerates very quickly and covers over the cortex quickly also without forming an adhesion.

This man has had some improvement. He has long been on antispecific treatment without any general effect. Since the operation his eyes have become worse, that is, there is now a distinct white optic atrophy, which is probably incurable. His headaches have improved. Yesterday he told me he had absolutely no headache. There are no peripheral findings in the way of paralyses, and, although we have not saved his vision, possibly we have done some good and have kept him from more serious cranial complications.

NOTE: On May 26th, thirty-six days after the decompression, Dr Brown reports that vision has improved from total blindness to the counting of fingers at 3 feet.

V. PERFORATED GASTRIC ULCER

In connection with what Dr. Baker, who is intern on our service, told you about the use of methylene-blue in perforating gastric ulcer, I wish to show you a case of perforated gastric ulcer. This man had gone four and one-half days from the time of perforation to the time of operation. Before the operation we gave him methylene-blue, but I will speak about that later.

First of all, in the symptoms of perforated gastric ulcer it is not so difficult to make a diagnosis when you get the case very early. You may recall the article by Dr. Gibson last year in which he reported some 30 cases with very low mortality—I think it was 40 per cent. In the histories of those cases you will find that he got them very early, within a few hours. Why we do not get them so early in Chicago I do not know, but it is every one's experience, as far as I know, particularly in this hospital, that the cases are of several days' standing before they ever come in. I operated on one duodenal ulcer that had perforated eight days before, which, very fortunately, made a recovery. This man is the fifteenth case of acute gastroduodenal perforating ulcer that I have operated on, the mortality averaging about 50 per cent. The symptoms of ulcer cases are, of course, not so difficult to describe. The pain is very severe and stabbing in character. One patient, having the perforation about 10 o'clock at night while lying on the couch, said the pain was so sudden and so severe that he was literally thrown off the couch and rolled over on the floor in agony, unable to get up. One working man had an acute perforation while rolling a wheel-barrow containing a load of castings. The case went to court after his death, his family saying that the ulcer was caused, or at least caused to perforate, by the fact that he was wheeling a wheel-barrow. In the face of all our arguments that the man must have had the ulcer for weeks before it perforated, the court awarded the family something like $3500 because the perforation occurred while he was wheeling a wheel-barrow instead of at home after supper, as it usually does.

When the peritonitis has started and the extravasation of the stomach contents has taken place in the first eighteen or

twenty-four hours the symptoms are well marked. There is sharp pain, tenderness, and vomiting. On the third and fourth day when these cases come into the hospital these symptoms are less pronounced. This man when he came in had no epigastric pain. There was some rigidity in the epigastrium, but he had more or less rigidity all over the abdomen. It was impossible from the standpoint of physical examination to localize a sharp point of tenderness in the epigastrium. You will find in these cases that there is more tenderness down in the groin *and in the iliac fossa. Why? Because the peritonitis is spreading down and down, and we have a *progressive peritonitis*, a condition resembling an appendicitis, which gives symptoms of sharp tenderness and pain localized in the lower part of the abdomen, and it is on this account that so many of these cases, after having gone four or five or more days, enter the hospital with a diagnosis of acute appendicitis. That is just exactly what was diagnosed here, and I have not the slightest bit of shame in telling you that I myself thought the man had acute appendicitis. I have opened two or three of them that way. We found he had more localized tenderness in the iliac fossa. In the event of a slight temperature of 101° F., with a moderate blood count, with a history of vomiting and a sudden onset of pain, one is liable to think the patient has an acute appendicitis, probably with the formation of an abscess that ruptured. Consequently, he was operated on   We considered a gastric ulcer after going over the symptoms, and finally decided to make an opening and prove or disprove the appendicitis. That was done, and when we opened the abdomen we found that the peritoneal cavity was full of free pus and other material which poured out profusely. Of course, it takes one just about a second to decide that it is not an appendicitis. While it looks like abscess material, there is absolutely *no odor* when it is a gastric ulcer   If there is an odor, it means that the colon bacillus is present, and you know you are dealing with the bowel or with the appendix. When there is no odor, you can be further helped by having some *sterile litmus-paper*, and on testing the material from perforated gastric ulcer one gets an acid reaction. That

proves beyond a shadow of doubt that you are dealing with a perforated stomach ulcer.

We made a midline opening higher up, and because we had used the methylene-blue we came at once to the perforation. There was the blue spot sticking right out in the field. There was no manipulation of the stomach or bowel. It was impossible to close it by means of a purse-string. It was simply lapped over by stitching and drained. I never do a gastroenterostomy in the face of a perforating gastric ulcer. Some men do. It is done here in the hospital, but I never could see the reason for it. It seems to me that we should get in and out quickly and do as little harm as possible. The pus is relatively sterile, but the abdomen is full of stomach contents, and it seems to me there is a strong indication for free drainage. This case was drained, with a simple closing over of the perforation. Rectal feeding was instituted for a few days, and then the patient was started on ulcer diet of milk and cream. He has reached the state where he gets a little bouillon. He is making a good recovery.

We have adopted the routine use of methylene-blue in aqueous solution prior to operation on suspected ulcer perforation. It should be administered not more than one-half hour before incision is planned. By the time the stomach is exposed, even in the absence of gastric movement or peristalsis, the few ounces administered will have penetrated to every corner of the stomach, and seepage out of the hole into or toward the peritoneal cavity will have followed. We do not wish to soil or stain the peritoneal cavity with the blue—we merely wish to find the hole. When the solution is given too long a time before operation leakage will soil areas surrounding the ulcer, which will not stand out so beautifully as it otherwise would. When the ulcer is on the posterior wall, and after opening no evidence of the color can be found on the anterior stomach wall, the surgeon must be sure the lesser peritoneal cavity is negative before he can completely eliminate perforating ulcer. I trust this method of ours will come into universal use; it saves time and manipulation of pathologic tissues.

CLINIC OF DR. EDWIN W. RYERSON

CHICAGO POLICLINIC HOSPITAL

TENDON TRANSPLANTATION FOR RELIEF OF PARALYSIS FOLLOWING ANTERIOR POLIOMYELITIS

Summary: A boy with marked contractures as the result of an attack of polio-myelitis four years previously, principles of treatment in infantile paralysis— the restoration of power to weakened muscles; methods employed; radical treatment not advisable within two years of the onset of the disease; technic of the transplantation of the biceps and semitendinosus into the tendon of the quadriceps extensor.

THIS operation is a tendon transplantation for the relief of paralysis following an attack of anterior poliomyelitis four years ago. Work of this kind is not advisable unless at least two years have elapsed since the onset of the disease, because improvement in muscular power and function may take place up to that period by the use of non-operative measures. At the end of this time it is proper to examine the patient with a view to determining the further treatment best adapted to the individual case. Some patients have so complete a flaccid paralysis that practically nothing can be done except to use braces and crutches. Others have so mild a paralysis that muscle training will give excellent results. Between these two extremes are many individuals who have unimpaired power in some muscles and total weakness in others. If these groups happen to be natural antagonists, the result will be such an imbalance of power that contractures of the healthy muscles are certain to occur, with the production of contracture-deformities. Such a case you see here.

This seventeen-year-old boy has complete paralysis of the quadriceps extensor of both thighs, so that he is unable to extend the legs at the knees. His flexor muscles, the powerful

hamstrings, are unaffected, and they have gradually contracted until the knees are flexed up beyond a right angle. He is unable to walk, and has spent the last two years sitting in a chair or lying down. Three years ago the legs were straightened at the Presbyterian Hospital, but soon after the plaster-of-Paris splints were removed the contractures returned in spite of the use of steel braces. Both feet are in very satisfactory condition and require no attention, since they are reasonably stable and not deformed, and are capable of weight bearing.

It seems probable that the boy will be able to walk if the legs can be straightened and if he can be given control of the knee-joints. In addition to the severe contractures of the knees the left thigh is flexed upon the pelvis nearly to a right angle, owing to the contracture of the tensor fasciæ latæ and possibly of the deeper structures. What shall be the plan of treatment? If we simply straighten the legs and do nothing else, the deformities will return when the casts or braces are discontinued, precisely as happened three years ago. The boy does not want to wear braces all his life if he can possibly avoid it. Can we not supply power to the paralyzed quadriceps extensors by utilizing some other strong and healthy muscles? The boy has three large and powerful hamstring muscles, the semimembranosus and semitendinosus on the inner side of the thigh and the biceps cruris on the outer side If we transplant two of these to the front of the thigh they will almost certainly furnish some active power for the extension of the leg Also, their deforming action as flexors of the knee will be removed, and the tendency to undue flexion will be greatly lessened It has been found advisable in most cases to make use of the biceps and the semitendinosus, leaving the semimembranosus alone to act as a flexor Occasionally the semitendinosus seems too small or too weak to be transplanted, and in such cases the semimembranosus is used.

The principle of treatment in infantile paralysis must always be to supply power to the weakened muscles whenever it can properly be done. During the first two years after the acute attack muscle-training, massage, and perhaps electricity (the

value of which is very doubtful) are used to develop whatever power may remain in the affected muscles. Braces and splints are applied if necessary to prevent deformity or to aid locomotion. After the two-year period radical treatment is advisable in suitable cases. As a rule, the more deformed the case, the more brilliant will be the result, except only the deformities of the spine.

The patient before us today is hideously deformed. His legs are absolutely useless, and are drawn up almost to the extreme limit. His left leg will be operated upon first, since it is contractured at the hip as well as at the knee. The best operation for the hip flexion is that devised by Robert Soutter, of Boston, and is done as follows: An oblique incision is made just below the anterior superior spine of the ilium and parallel to the crest of the ilium. The cut is about 3 inches long and it is carried down to the periosteum. With an elevator the periosteum is pushed downward from the anterior superior spine, carrying with it the origin of the tensor fasciæ latæ. Some strong bands of contracted fascia can usually be felt running backward and upward, and these can be divided safely. You can see that the thigh can now be extended about 20 degrees farther than before, but this is not sufficient. We examine farther inward, toward the groin, and find that the sartorius muscle is too tight. This is pushed and cut with the elevator, and the thigh can now be straightened out still more. Even this is not enough, and we must go deeper. *The rectus femoris arises from the anterior inferior spine of the ilium*, and I can feel that it is tense and resistant, so I pass a Kocher director under it and cut it from its origin. The incision is now sewed up and the boy rolled over on his right side, so that we can get at the back of the thigh. A very long incision is made in the middle of the back of the thigh, extending from the level of the head of the tibia upward almost to the tuberosity of the ischium. It is a grave mistake to attempt this operation through too short an incision. The skin and superficial fascia are dissected up and pulled aside by retractors. The biceps muscle and tendon can readily be seen running along the outer side of the popliteal space. The fascial sheath is split, and

1

Long head of biceps

semitendinosus

2

Shot

3

f threading ends

*semitendinosus
from end of tendon.*

Tom Jones
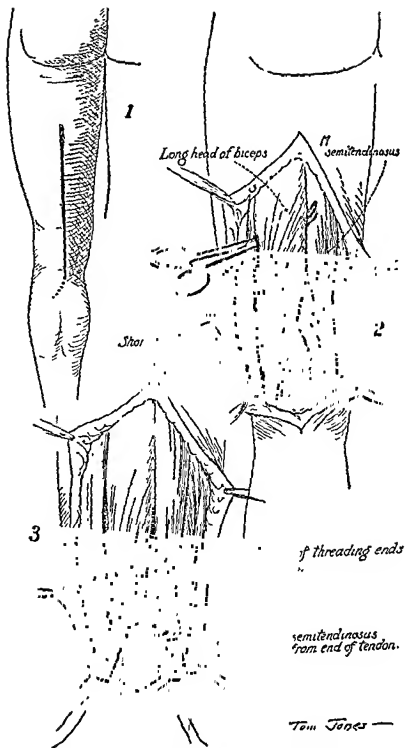
the muscle fully exposed from its insertion into the head of the fibula, upward 7 or 8 inches. It can now be seen that the lateral (outer) portion of the muscle is made up of long bundles of fibers running directly upward to the tuberosity of the ischium, while the lateral portion is composed of shorter fibers running diagonally inward and upward to the shaft of the femur, like the fibers of a goose-quill reversed. These latter muscle fibers form the short head of the biceps and take origin from the shaft of the femur. This part of the biceps is not so useful for transplantation as is the long head, and we are going to separate the biceps into its two component parts and transplant only the long part. The common tendon is broad and thin, and it requires a little care to dissect it cleanly into two halves, but, as you see, it can readily be done, and the long head is now completely isolated down to the fibula. By keeping in the fascial sheath, we avoid injury to the external popliteal nerve. It is very important to cut the tendon as low as possible in all cases where the leg is permanently flexed, because it must be sewed into the patella with only a slight amount of tension to insure good union. This boy's leg is so much flexed that we may have to lengthen the tendon by artificial means to enable it to reach the patella. A strong kangaroo-tendon suture is now woven into the biceps tendon, starting at the distal end and weaving it in and out, going upward about 2 inches, and then going downward again and out through the end of the tendon. We can thus obtain a perfectly solid grip of the tendon and also make the tendon itself a little rounder and firmer, since it is always rather flat and stringy. The ends of the suture are now clamped with a hemostat and laid aside for the present.

The inner side of the long skin incision is now retracted, and the skin dissected up to expose the inner set of hamstring muscles, the semitendinosus, and the semimembranosus. The former is

is thrust downward and backward just under the skin, in the subcutaneous fat, emerging in the posterior wound near the biceps tendon. The forceps is opened and shut during its passage, so as to tear a wide tunnel just under the skin. The kangaroo-tendon prolongation of the biceps is seized by the forceps and pulled up through the tunnel, bringing the biceps with it. The tunnel must be made on a long slant upward toward the ischium, so that the muscle can pull in as direct a line as possible without having to go around too sharp a corner. The same thing is done on the inner side of the thigh and the semitendinosus is brought out to the patella. As you see, the biceps is too short to reach all the way to the patella unless a great deal too much tension be put upon it. There is a space of 1½ inches to be bridged over by the kangaroo-tendon prolongation. We could readily take a piece of fascia lata, roll it up like a tendon, and suture it to the biceps and to the patella, but this is usually not necessary. For distances under 1 inch the kangaroo-tendon seems to be sufficient to make a firm union, although it is possible that some of the few failures in this operation may be due to this technic. In ordinary cases without much flexion deformity the tendons are amply long to reach the patella.

A longitudinal cut is now made in the periosteum of the patella at the outer side, and the two strands of the kangaroo-tendon, threaded into strong curved needles, are passed into the slit, in diverging directions, forward and outward, through the strong periosteum and fascia, and tied. This gives a very firm insertion, and it is probable that tendon tissue or connective tissue grows along the suture so as to make a good union. Besides this anchor-suture to the patella, we put in several interrupted chromic catgut sutures to fasten the biceps tendon to the vastus externus and the quadriceps tendon. This gives excellent fixation.

We now take up the semitendinosus, and find that it is long enough to reach to the patella with only a reasonable degree of tension. A slit is cut in the periosteum of the patella, as before, the kangaroo sutures passed in opposite directions through the periosteum and fascia, and as the sutures are tightened the

semitendinosus comes directly into the slit.   The sutures are
tied, the tendon is sewed to the vastus internus by several inter-
rupted sutures, and the tendon sheath is pulled down along the
tendon as far as it will go and secured by a stitch or two.   This
small detail of preserving the sheath insures against the forma-
tion of adhesions, and is well worth remembering, although the
adhesions that sometimes form in the case of the biceps (where
the sheath cannot be utilized) are not of very great importance.

The incisions in the skin are now sutured with continuous
catgut on a long straight Keith needle, and the leg and thigh are
incased in a plaster-of-Paris bandage.   At the end of six weeks,
or even less, active motions and muscle-training are begun.

In nearly all these cases the results are excellent.

PENDULOUS ABDOMEN: CURE BY REMOVAL OF EXCESS FAT AND OBLITERATION OF VENTRAL HERNIAS

Summary · Indications for the operation; technic; best to leave the umbilicus unless there is an umbilical hernia, imbrication of overstretched fascia frequently desirable even in the absence of hernia; wound closure—importance of plate-tension sutures and drainage

An operation which is of great value in a limited number of cases is the removal of a portion of the abdominal wall. The indication is not very frequent, but there are individuals who suffer a great deal from excessively fat and pendulous abdomens for which such a procedure may become a necessity.

One of the symptoms is a continuous, very heavy sensation over the stomach. Another symptom is backache and intestinal disorder due to the abnormal length of the mesentery.

The patient at first tries belts and supporters, but after a time these cease to be of value, since they do not give sufficient support. Eventually these people find that there is no way of constricting the abdomen which will prevent a large fold of fat and skin from hanging down like a cumbersome apron (Figs. 265-267).

They also suffer a great deal from the results of the accumulation of secretion in the folds of the skin, which macerate the skin somewhat, cause itching and scratching, and the result is a dermatitis, sometimes of marked severity.

There is no doubt that patients who suffer from these symptoms feel greatly relieved after this large flap with the underlying fat has been removed (Fig. 268), and the abdomen has been thereby reduced to a size which prevents the hanging down of this apron with all its attendant discomforts.

the abdomen much smaller However, the easiest cases of
this class in which to get a good result are those in which the
operation is done purely for the purpose of removing all the
superfluous fat of the pendulous abdomen

The operation itself is not very difficult It is more com-
plicated if we have to deal with a hernia at the same time, as
then we have to lay open a large surface of the abdominal wall,
and, in case we have not primary union, we run the risk of
having a worse condition afterward than before the operation
The method is simple

We make an elliptic excision of the abdominal wall by
means of two curved transverse incisions, starting from one
side and arching respectively one above and the other below
the umbilicus to the other side, including as much of the pendu-
lous apron as it appears to be desirable to remove. This large
elliptic piece must be dissected from the abdominal fascia There
is one difficulty in this dissection, namely, at the umbilicus
the skin is very thin and has no fat, while surrounding the
umbilicus there are large and thick layers of fat. When we
dissect out the umbilicus, therefore, we have very unequal sur-
faces to unite, a surface which in the center is almost entirely
free from fat, while on each side is a steep wall of fat. This
makes the central union somewhat difficult and endangers
the result in a way, particularly when we have to deal with a
hernia in the umbilical region—a weak spot of union underneath,
and on top the thin scar, lying also in that weak spot Con-
sequently I have made a change in the later cases in which I
have performed this operation, which consists in leaving the
umbilicus, especially if it is not the seat of a hernia

The navel is demarcated by a circular incision having the
umbilicus at its center, and with a radius of about ⅔ to 1 inch,
and the skin dissected from the same downward toward
the fascia This leaves a tube-like arrangement with a
flange of skin-flap on the outside connected with the abdo-
men If there is no dilatation around the navel, nothing
else needs to be done If, however, the fascia is obviously
much stretched out, as in many cases, then it is incised trans-

versely and the fascia from one side of the incision is super-
posed or imbricated upon the other, like the tiles of a roof
This not only strengthens the abdominal wall but also makes
it less projecting. The flange of skin about the umbilicus is
sutured above and below to the border of the wound, and the
whole abdomen, after the entire wound has been sutured, pre-
sents the appearance of a normal abdomen with the navel in
its normal position. If a hernia exists it is, of course, taken
care of before the abdominal wound is sutured

Any of the methods advocated in the text-books in regard
to the cure of umbilical, para-umbilical, and epigastric herniæ
may be used in these cases.

As far as the suture of the skin is concerned, we have found
that the plate-suture is the best. It can be retained as long
as one wishes. It is best to have tension sutures, and if prop-
erly applied they do not lead to any necrosis of the skin. The
plate suture consists of silver-wire sutures tied over lead plates,
and four sutures of this kind ought to be plenty to retain this
very large wound in apposition until union takes place. It
is very important in these cases that there should be primary
union For this reason it is absolutely necessary to ligate every
little vessel before the wound is closed, and to be doubly sure
it is well to leave a little drainage-tube in the outer border of
the wound, so as to prevent the accumulation of secretions
by affording them prompt exit. One may use a rubber tube
for this purpose, or drainage by means of a few strands of silk-
worm-gut is applicable. After union has taken place it is im-
portant to protect the abdomen by a supporter for some time.

I shall handle the present case in accordance with the general
principles which I have just outlined. This patient, Mrs. D ,
who weighs 295 pounds, is, however, not so fat on her body
as on her abdomen. When she stands her abdomen hangs down
considerably over her symphysis pubis and she has considerable
pain in the upper part of her abdomen, about 2 inches above
the umbilicus. To the right side of the umbilicus, above, is a
hernia about the size of a fist, which protudes on coughing We
have to deal here with an epigastric hernia. Her worst symp-

toms appear when she stands She herself suggests the desirability of removing a part of that large abdomen to relieve her condition

The usual transverse incision is made The epigastric hernia has a ring of about the size of a quarter, through which a large portion of the great omentum, adherent to a sac, is propelled and cannot be fully returned on account of adhesions The sac is opened, the ring slightly enlarged, the adhesions to the sac severed, the omentum returned to the abdominal cavity,

Fig 269 —Case after operation Plate sutures in the center The umbilicus in this case has been retained and can be seen sutured in, in the center of the scar On both sides are short tubes for drainage

and the edges of the ring freshened and sutured accurately in a longitudinal direction; thereupon the navel is dissected and a flange left in the way I have already described The umbilical region is slightly protruding, a transverse incision of the fascia with imbrication to the extent of about 2½ to 3 inches on each side of the umbilicus strengthens the abdominal wall Plate sutures are applied and two drainage-tubes attached, one in each corner (Fig 269).

NOTE· This patient made a perfect recovery

TRANSPERITONEAL APPROACH TO THE KIDNEY

Summary: Advantages of the ordinary posterior oblique incision; difficulties encountered in cases complicated by massive neoplastic or inflammatory infiltrations; easy, safe, and bloodless access to such kidneys afforded by transperitoneal route; operative technic.

In the course of years we grow accustomed to a certain operative technic, and because it is satisfactory we are loathe to make a change. The kidney has been removed in a more or less typical manner through a posterior oblique incision ever since I can remember. The most important reason for choosing this route is to make the operation extraperitoneal. The kidney lies behind the peritoneum, and our reluctance to invade this cavity during the operation led us to look for a route outside of the same. In infected cases where we fear an infection of the peritoneum, and in those cases in which we leave the kidney behind, as in nephrotomy for stone or abscess, where the escape of urine into the peritoneum would be fatal, we favor an extraperitoneal operation. This is also the most convenient route for drainage because, with the patient in the recumbent position, the drainage opening lies at the most dependent part of the wound.

There is, however, a certain disadvantage in this operation, a disadvantage which may mean a great deal in some pathologic conditions. It lies in the difficulty in reaching the blood-vessels which supply the kidney, especially in those cases in which there is a large tumor of the kidney with a good deal of infiltration around the pedicle of the vessels. In such instances the hemorrhage produced by the separation of the tumor through the ordinary posterior incision is so profuse that the ligation of veins and small arteries, lying deeply as they do, becomes next to impossible, and consequently a good deal of blood is lost before the pedicle with its blood-vessels is reached. This is one of the difficulties of the customary technic, especially

when the incision is not very large. There are many cases
in which the kidney root is not free and movable in which
the indication for nephrectomy is present; cases in which ab-
scesses have been drained, so-called dead kidney, chronic tu-
bercular kidney, etc. Inflammatory or neoplastic infiltration
around the kidney may be so dense that it is impossible to de-
liver the kidney or even to expose it sufficiently to allow a clamp
to be applied to the vessels in the pedicle. Special clamps
have been constructed for this purpose, but the vessels are better
taken care of under such circumstances when they are rendered
visible by the adoption of another route of approach.

Often an experienced surgeon will perform a good operation
in these cases, but he is apt to have a great deal of difficulty,
and often, in trying to separate the kidney, will tear one of the
large vessels and produce dangerous hemorrhage, or leave por-
tions of the kidney behind, which afterward prevent primary
union and lead to persistent fistulæ.

I have used the transperitoneal method in a number of cases,
and I feel that in many instances it has given me an easy, safe,
and bloodless access to the infiltrated kidney which I could not
have achieved otherwise. It made it possible to do every step
of the operation under the guidance of the eye.

The method is simple: A long incision is made anteriorly
in the nipple line, from the rib border vertically downward
(Fig. 270), and the peritoneum is opened. On the right side
the ascending colon is lying in front and over the middle of a
large tumor of the kidney. The peritoneum lies loosely over this
projecting area. The first thing to do is to wall off the peri-
toneum accurately, so that in case infectious material should
escape, we may deal with it just as we would with any abscess in
the abdomen. After walling off clear around this large tumor
we pick up the peritoneum and incise it again in the same longi-
tudinal line as high up and as low down as is necessary
to expose the tumor, and dissect directly toward the center
of the body on the median aspect of the kidney, separating
the tissues with blunt scissors and avoiding the cutting of vessels
as much as possible   We arrive at the arteries and veins leading

off toward the aorta and vena cava. These vessels are grasped
between two forceps or, preferably, between three forceps
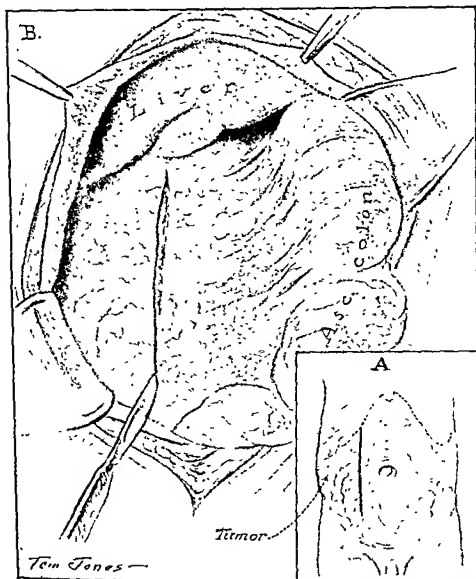
Fig 270—A case of renal tumor operated on by the transperitoneal route:
1, External view of the abdomen Note line of incision, distended veins, and
bulging of the side on which the tumor is located B, Abdomen opened The
ascending colon displaced medianward by the tumor Incision is made through
the peritoneum over the prominence of the tumor and it is shelled out, ligating the
vessels as they are brought into view.

if possible, because leaving two forceps on the vessels and one
forceps on the kidney is preferable to leaving only one forceps,

DIASTASIS OF THE EXTERNAL OBLIQUE SIMULATING A DIRECT HERNIA OF THE ABDOMEN AND ITS CURE

THERE are a number of individuals whose abdominal wall is naturally defective. When these people work at a task which involves the production of a marked increase in the intra-abdominal pressure—*i. e.* heavy lifting and straining—they are apt to produce a bulging of the inguinal region more toward the side of the body than in the usual position of an inguinal hernia, but in the neighborhood of the external ring. Sometimes this bulging extends clear down into the external ring (Fig. 272).

When we investigate the nature of this trouble, which occasionally causes the patients a good deal of discomfort characterized by a feeling of weakness and a dragging sensation in the side, we find that it is an exaggeration of a natural anatomic condition. Everyone who has operated on a large number of appendices knows that when one incises the abdominal wall to the fascia of the external oblique he often finds a place in the fascia where the fibers are separated, a sort of cleavage of the fascia. This natural cleavage is probably present in 60 to 70 per cent. of all people. Following it down to the external ring, one finds that it condensates a little toward the external inguinal ring except in some individuals, in whom it extends clear into the ring. If these people are thin and do not develop their muscles much, their abdominal wall gives way along this weak spot, and the cleavage, which is originally very small, becomes a space $\frac{1}{4}$ to $\frac{1}{3}$ inch in width, through which the underlying muscle is clearly visible (Fig. 272). This muscle being again underdeveloped or atrophied, a bulge appears at this weak spot whenever the patient stands. There is really no hernia in the true sense of the word, not even a direct
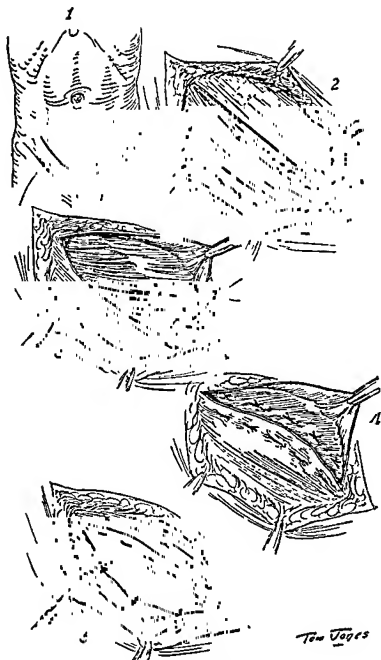
Fig. 272.

hernia, inasmuch as the peritoneum does not get into this external dilatation, but the defect nevertheless requires repair. Supporters will not do. The best treatment—with which there must be associated general hygienic measures, increase of nourishment, and so on—is the suture of the fascia by imbrication.

The accompanying illustration (Fig. 272) explains this procedure perfectly.

Fig. 272.—Diastasis of external oblique: *1*, Abdominal wall showing (arrow) the hernia-like protrusion; *2*, incision down to the fascia demonstrating the separation of the fibers of the external oblique aponeurosis, a weak spot which acts like a hernia; *3*, the edges of the split in the fascia are freed and the lower one is drawn upward and medianward and sutured to the fascia of the rectus with mattress sutures; *4*, the mattress suture completed; *5*, the median part of the fascia is then imbricated upon the lower or lateral shelf with a few stitches and the skin closed. The position of the mattress sutures is indicated by interrupted lines. They, of course, are covered by the skin and superficial fascia.

CLINIC OF DR. DANIEL N. EISENDRATH

COOK COUNTY HOSPITAL

THE DIAGNOSIS AND TREATMENT OF COMMON DUCT CALCULI—WITH SPECIAL REFERENCE TO OVER-LOOKED COMMON DUCT CALCULI

Summary · A patient who has twice previously been operated on for gall-stone disease and now presents the picture of attacks of epigastric pain, icterus, clay-colored stools, chilly sensations, and fever of the continuous type; causes of recurrence of symptoms following operations on the biliary passages; obstruction of the common bile-duct—differential diagnosis, technic of the exposure, the exploration, and the drainage of the common and hepatic ducts; great importance of adequate exploration of the bile-ducts.

THE patient whom we propose to operate on today is an example of the unsatisfactory results which at times follow operations upon the bile-passages. She was admitted to my service one week ago with the following history:

She is forty-nine years of age, and states that her present illness began about one year ago with recurrent attacks of severe pain in the right upper quadrant of the abdomen radiating to the right shoulder. In July, 1916, at another hospital the gall-bladder was drained after removing a number of small calculi. After about five months she was operated upon again on account of a biliary fistula which had persisted since the first operation. At this second operation a calculus, firmly lodged in the cystic duct, and which had evidently been overlooked at the previous operation, was found as the cause of the fistula. The gall-bladder as well as the offending calculus was removed at this second operation and the wound closed about three weeks previous to her admission to this hospital. The same surgeon performed the cholecystostomy and the later cholecystectomy, and has informed me that he palpated the com-

mon duct at the second operation, but could detect no calculi.
Ever since the wound of the last operation healed she has had
recurrence of pain in the epigastrium accompanied by jaundice
and clay-colored stools every six to seven days. The present
attack of pain, jaundice, and fever has been of longer duration
than any of the previous ones, and was accompanied by nausea,
vomiting, and pruritus. She has had some *chilly sensations, but
no distinct chills*. Her past and family history are negative,
and the same is true of her menstrual and obstetric history.
Her temperature during the week since her admission has varied
from 101° to 103° F., her stools have been clay colored, and the
icteric hue of the skin and visible mucous membranes has be-
come deeper from day to day.

Examination before operation today shows a markedly icteric,
poorly nourished woman. The examination of the head, neck,
and thorax, aside from the icteric skin and sclerae, is negative.
There is distinct tenderness over the epigastrium, especially to
the right of the median line. No tumor mass or enlargement of
the liver or spleen can be felt.

Before beginning our operation let us discuss *why a patient
who gives the history of recurrent attacks of gall-stone colic,
who had a drainage of a gall-bladder filled with calculi eight
months ago, and a removal of the organ on account of a biliary
fistula due to an overlooked cystic duct calculus six months
later, and whose common duct at this second operation was
negative to palpation, should still continue to suffer from at-
tacks of pain in the epigastrium accompanied by intense icterus,
clay-colored stools, chilly sensations, and fever of the continuous
type.*

We may divide the recurrence of symptoms after operations
upon the biliary passages into *true and false recurrences de-
pendent upon their relation to the actual reformation of calculi.*

Causes of True Recurrence.—1. Reformation of calculi
in the gall-bladder: (*a*) due to recurrence or persistence of infec-
tion, and (*b*) due to reformation of calculi (Fig. 273) in the
crypts of Luschka.

2. Reformation of calculi in the common, hepatic, or intra-

hepatic ducts as the result of recurrence or persistence of infec-
tion.

3. Reformation of calculus in stump of cystic duct.

4. Reformation of calculus around silk ligature.

Of these, the last named does not occur at the present time,
but there are reports of formation of calculi around ligatures or
sutures of this material when it was employed in the early days
of gall-stone surgery.

In the second group I believe that we can eliminate all ex-
cept intrahepatic calculi, because the majority of the calculi
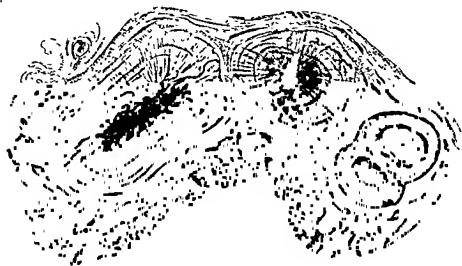
Fig. 273 —Section of gall-bladder wall showing stratified cholesterol calculi form-
ing in the dilated crypts of Luschka (Aschoff)

found at secondary operations on the hepatic or common ducts
are now believed to have been overlooked[1] at the primary opera-
tion and really belong under false recurrences.

It is impossible at the present time to express an opinion as
to whether intrahepatic calculi when they give rise to recur-
rence symptoms belong to the true recurrence group, i. e., are
newly formed as the result of recurrence or persistence of the

[1] See article by author on "Overlooked Common Duct Stones" in Jour. Amer
Med Assoc, March 31, 1917, vol 68

mon duct at the second operation, but could detect no calculi. Ever since the wound of the last operation healed she has had recurrence of pain in the epigastrium accompanied by jaundice and clay-colored stools every six to seven days The present attack of pain, jaundice, and fever has been of longer duration than any of the previous ones, and was accompanied by nausea, vomiting, and pruritus. She has had some chilly sensations, but no distinct chills. Her past and family history are negative, and the same is true of her menstrual and obstetric history. Her temperature during the week since her admission has varied from 101° to 103° F., her stools have been clay colored, and the icteric hue of the skin and visible mucous membranes has become deeper from day to day.

Examination before operation today shows a markedly icteric, poorly nourished woman. The examination of the head, neck, and thorax, aside from the icteric skin and sclerae, is negative. There is distinct tenderness over the epigastrium, especially to the right of the median line. No tumor mass or enlargement of the liver or spleen can be felt.

Before beginning our operation let us discuss why a patient who gives the history of recurrent attacks of gall-stone colic, who had a drainage of a gall-bladder filled with calculi eight months ago, and a removal of the organ on account of a biliary fistula due to an overlooked cystic duct *calculus six months later*, and whose common duct at this second operation was negative to palpation, should still continue to suffer from attacks of pain in the epigastrium accompanied by intense icterus, clay-colored stools, chilly sensations, and fever of the continuous type.

We may divide the recurrence of symptoms after operations upon the biliary passages into true and false recurrences dependent upon their relation to the actual reformation of calculi.

Causes of True Recurrence.—1. Reformation of calculi in the gall-bladder: (a) due to recurrence or persistence of infection, and (b) due to reformation of calculi (Fig. 273) in the crypts of Luschka.

2. Reformation of calculi in the common, hepatic, or intra-

been one of gastric or duodenal ulcer, hysteria, tabes with visceral crises, or even a spinal tumor.
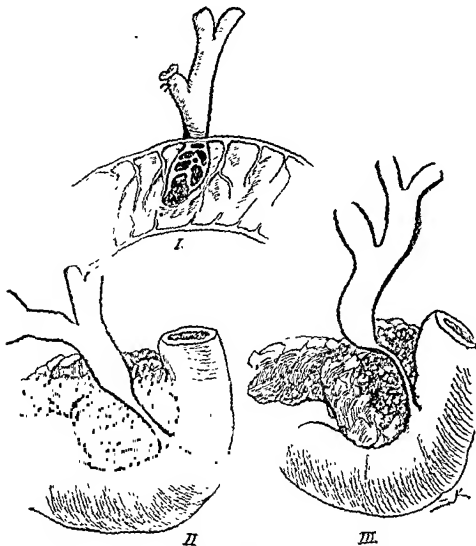
Fig. 274.—Diagrammatic views of various forms of obstruction of common duct: *I*, Large calculus found firmly impacted in ampulla of Vater with smaller ones behind it. All of these had been overlooked in this case at cholecystostomy with removal of calculi and later cholecystectomy. *II*, Compression of common duct by chronic indurated head of pancreas. *III*, Compression of common duct by carcinoma of head of pancreas.

11. Pancreatic calculus.

Under which of the groups of true and false recurrences does our case belong?

If you will recall the chief points in the patient's history we can at once eliminate all the above causes except the following:

1. Reformation of calculus in dilated stump of the cystic duct.

2. Adhesions, especially of the omentum, stomach, or duodenum, to the liver bed from which the gall-bladder has been removed.

3. Overlooked calculi or a stricture or persistent infection of the common or hepatic ducts.

4. Marked enlargement of the head of the pancreas compressing the lower end of the common duct as the result of an interstitial chronic pancreatitis.

5. Cancer of the head of the pancreas overlooked at the time of the previous operations or possibly developed in the interval.

6. Cicatricial contraction of the ampulla of Vater or its obstruction by a pancreatic calculus

Now the salient points to be considered in making a diagnosis of this case are: 1. Previous cholecystotomy for many small calculi, later cholecystectomy. 2. Present symptoms: pain to right of median line above umbilicus, marked icterus, fever, clay-colored stools.

The symptoms point strongly to some form of almost complete obstruction of the common duct, but may be due to an infection alone.

A glance at Fig. 274 will show the compression of the common duct by the enlarged head of the pancreas, and Fig. 275 will explain why an infection in the gall-bladder or bile-ducts can be carried by the lymphatics of these structures to the pancreas, resulting in a pancreatic lymphangitis with a subsequent interstitial pancreatitis, which, in turn, causes compression and, consequently, obstruction of the common duct.

DIFFERENTIAL DIAGNOSIS OF COMMON DUCT CALCULI FROM INFECTION (CHOLANGITIS) AND FROM OTHER CAUSES OF OBSTRUCTION OF THE DUCT

1. **Common Duct Calculi.**—Calculi in the common or hepatic ducts, but especially in the former, may appear under one of

several clinical pictures; e. g., as (a) acute complete closure—
sudden onset of marked icterus, clay-colored stools, fever, and
colicky pains. Such symptoms, if of transitory nature, are
usually due either to an acute inflammatory enlargement of the
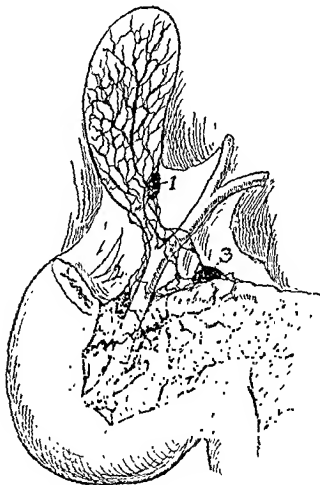
Fig. 275.—Lymphatics of gall-bladder, bile-ducts, and pancreas (modified
from Franke): *1*, Lymph-node at neck of gall-bladder which acts as a relay be-
tween lymphatics of gall-bladder and those of common duct. *2*, Lymph-node
along right edge of common duct which communicates by a number of lymphatic
trunks with lymph-nodes of pancreas. *3*, And the last named, in turn, with
interstitial lymphatics of the pancreas.

head of the pancreas or less frequently to a calculus (Fig. 274)
engaged in the ampulla of Vater. It was formerly believed that
the subsidence of the symptoms was due to a form of ball-valve
action of the calculus in slipping back into the common duct, as

Fenger first pointed out. Körte, Kehr, and others are of the opinion that the intermittent character of the acute obstruction is more likely the result of an acute inflammatory enlargement of the head of the pancreas.

(b) Chronic closure cases. In these patients there is more or less constant obstruction of the common duct with resultant icterus, fever, clay-colored stools, colic, and chills. The icterus as well as the other symptoms vary greatly, according to the degree of obstruction and the virulence of an accompanying infection.

(c) Latent cases. Moynihan, Körte, Kehr, and a number of other writers have called attention to cases in which either calculi or infection alone, or both combined, were present without any of the above symptoms, usually considered characteristic at least of common duct calculi. In the paper referred to above, I reported finding calculi in the common duct in 10 cases (2 previously operated by other surgeons) in which palpation was negative in all. In 6 of these all of the above symptoms (icterus, fever, chills) were absent, and the colicky pain could not be distinguished from the accompanying gall-gladder infection. This confirms the statement of Kehr[1] that common duct calculi are present in 1 out of 5 cases in a latent form, i. e., without causing the symptoms usually thought to be pathognomonic of common duct calculi.

2 Adhesions.—Only by means of a careful x-ray examination can the presence or absence of this cause of recurrence be determined.

3. Overlooked Calculi, Stricture, or Persistent Infection of Common Duct.—In this case we need only consider that the previous operator has overlooked one or more calculi in the common duct because the gall-bladder has been previously removed. Even if the latter were present, we know that icterus is only present, as a rule, in slight degree in cholecystitis with or without calculi, and the same is true of obstruction of the cystic duct. If icterus were absent, and the gall-bladder had not been removed, it would be rather difficult to distinguish the attacks

of colicky pain due to calculi in the gall-bladder from those due to calculi in the common duct. The pain in the latter is, as a rule, less severe, nearer the median line, and is much more frequently accompanied by the symptoms of cholangitis, such as chills and fever, even when icterus is absent.

The differentiation of stricture of the common duct from calculi in the same is impossible before operation, as a rule, unless the x-ray is positive.

Infection within the common or hepatic ducts manifests itself clinically in an acute and a chronic form. In the former, which is probably the result of an acute pancreatitis, there is in the mildest form transitory icterus, dull pain in the epigastrium, slight fever, and a chilly sensation. In the more severe acute form there is a marked toxemia, icterus, and fever of an intermittent type, often preceded by chills and followed by sweats. Death from the profound sepsis may occur in these cases even though the calculi be removed and the common duct drained.

In the more chronic form the above symptoms are present to a lesser degree, but there is a continuance of the infection in the finer bile-ducts in spite of ample drainage. There is no longer any doubt that a severe cholangitic infection can exist without the presence of calculi, just as we see the most grave cholecystitic infection and find no calculi at operation.

4. Chronic Pancreatitis and Cancer of Head of Pancreas.— It is practically impossible before operation to distinguish non-malignant enlargement of the head of the pancreas unless there is an ascites and palpable distention of the gall-bladder present as indicative of a malignant tumor compressing the lower end of the common duct. The jaundice is, as a rule, more intense in a malignant enlargement, and the same is true of the absence of bile in the stools. Emaciation is also more rapid.

The differentiation of obstruction of the common duct due to a calculus and that due to a chronic pancreatitis alone is usually impossible unless there is a history of attacks of gall-stone colic preceding the appearance of the symptoms of common duct obstruction. Cholangitis may be present in both calculous and chronic pancreatitic obstruction, so that the pres-

ence or absence of the symptoms of infection (chills, fever, etc.) is not to be depended upon as excluding one or the other. Jaundice and clay-colored stools are *usually present in both, but are apt to be less marked in chronic pancreatitis.* Pain of a dull character is often present in both conditions.

TECHNIC OF OPERATION

The steps of the technic which I employ is best understood by a study of Figs. 276 to 278.

Step One.—The incision (Fig. 276) to expose the gall-bladder extends from the angle formed by the ensiform process and costal arch downward through the inner third of the right *rectus muscle to a little above the level of the umbilicus. The* patient's lumbar region has been previously elevated by the device attached to the operating tables in common use. The above incision not only permits the most perfect exposure of the common and hepatic ducts as well as gall-bladder, but enables one to inspect directly the stomach and duodenum. It is surprising how close to the abdominal wall such an incision brings the principal bile-passages.

Step Two.—After having inspected the stomach and duodenum, the gall-bladder is examined, and if calculi are contained therein, these are removed by the generally accepted method of an incision through the fundus of the gall-bladder, after having aspirated its contents with the trocar and rubber tube attached to a 3-ounce metal syringe.

Step Three.—Exposure of the Bile-ducts.—The fundus of the empty gall-bladder is grasped by a long-bladed artery forceps, and an assistant instructed to make gentle traction in the direction of the right shoulder. This procedure also pulls the right lobe of the liver in the same direction as first suggested by Mayo-Robson. The neck of the gall-bladder, cystic, hepatic, and common ducts are now exposed. If these structures are enveloped in adhesions, the exposure obtained enables one to separate and ligate the adhesions and to cover with suture raw surfaces by sight and not by touch. A very important detail in securing a good exposure of the common duct is to have the

proper retraction not only of the gall-bladder and right lobe of
the liver toward the right shoulder but also of the stomach,
transverse colon, and of the omentum toward the left and
downward. Such retraction is best secured (a) by the use of
the Deaver and Kelly retractors; (b) by not packing too much
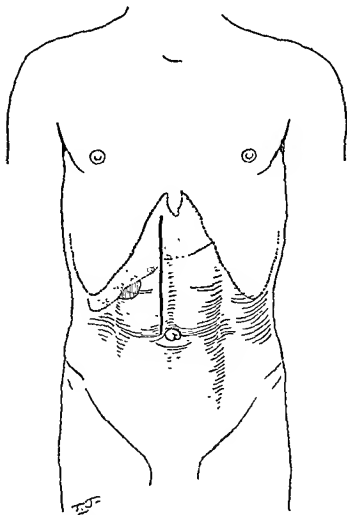
Fig. 276.—Modified Kehr incision through the inner third of the right rectus
muscle.

gauze into the abdomen, and (c) by instructing the assistants
(preferably only two being employed) only to keep up firm re-
traction, and not to relax their holds from time to time, thus
permitting the above viscera to drop into the field and cover the
common duct.

Traction
suture

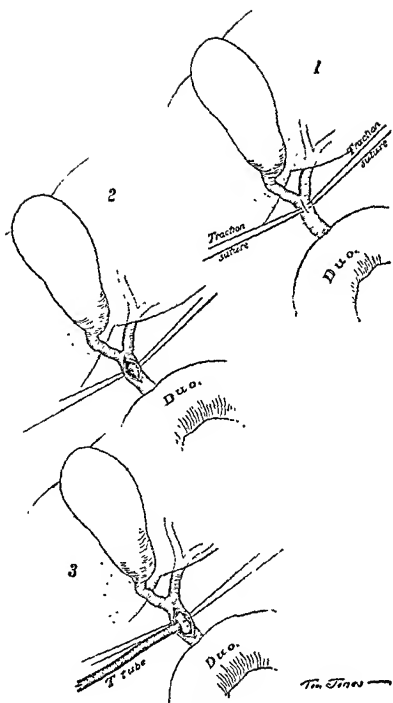Traction
suture

Duo.

2

Duo.

3

T tube

Duo.

Tim Times

Fig. 277.

*Step Four.—Exploration of Common and Hepatic Ducts.—*I prefer to employ instruments and suture material as fine as those used for eye operations in opening the common duct. The hepatoduodenal ligament is first identified as marking the right border of the envelope of peritoneum covering the common duct, portal vein, and hepatic artery. By retraction of the viscera (especially the duodenum) around the common duct the latter is readily seen covered by a thin layer of peritoneum, which is divided by a fine scissors, and the opening thus made widened by spreading it with a blunt-bladed curved scissors. Two traction sutures of very fine (00) catgut are inserted with an extremely small needle (such as is used for eye work) through the wall of the common duct in its supraduodenal portion (Fig. 277). There are a few small veins which run parallel to the duct, and occasionally an anomalous small artery which passes transversely across the front of the duct. Bleeding from both of these vessels is easily controlled by a transfixion ligature. The duct is now incised with a fine, preferably angular, scissors for a distance of $\frac{1}{4}$ to $\frac{1}{2}$ inch. It is a wise precaution before opening the common duct to place a gauze sponge into Morison's pouch over the right kidney. The opened common duct (Fig. 277) is now explored in an upward direction into the hepatic ducts and then downward, until one feels certain that no calculi have been overlooked. A flexible probe is finally passed through the papilla in order to be sure that the lower end of the common duct is not obstructed.

*Fifth Step.—Drainage of the Common Duct.—*I prefer the T-shaped rubber tube first used by Kehr (Fig. 278), and which is now in this country employed by Deaver and others. The opening in the common duct is closed around this tube with the same size chromic catgut which was employed in the traction

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Fig. 277.—*1,* Gall-bladder has been emptied of its contents and drawn toward right shoulder by forceps applied transversely to fundus. Traction suture of fine chromic gut shown inserted through wall of supraduodenal portion of common duct on either side of incision in same. *2,* Edges of incision in common duct retracted before exploration of hepatic and common ducts. *3,* Insertion of T tube into supraduodenal portion of common duct.
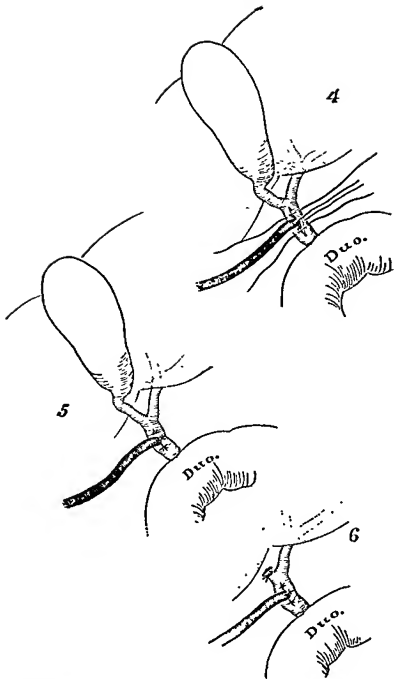
Tom Jones
700

Fig 278.

sutures described in Step Four. The tube itself (whose horizontal limbs should only project about about $\frac{1}{4}$ inch beyond the vertical portion) is held in place with a plain catgut suture.

*Step Six.—Removal of the Gall-bladder.—*I prefer to do the cholecystectomy, if one has decided that the pathologic changes in the gall-bladder demand its removal, after the common duct exploration and drainage, because the gall-bladder is a very convenient tractor for the common duct. Kehr reverses the steps by first removing the gall-bladder and cystic duct close to the common duct, then enlarging the cut end of the stump of the cystic duct so as to make an opening in the common duct large enough to explore both the latter and the hepatic duct, introducing his T-tube through the same opening.

The technic of cholecystectomy requires no special description. I first carefully separate the neck of the gall-bladder and cystic duct from the common duct before ligating the cystic artery, which runs, as a rule, along the upper border of the cystic duct. The latter should be ligated as close as possible to the common duct in order to avoid the formation of a gall-bladder in the dilated stump of the cystic duct. The careful separation just mentioned enables one to avoid injury of the common duct if, as frequently occurs, the diverticulum-like enlargement at the neck of the gall-bladder is adherent to the common duct or if any of the anomalies in the course of the bile-ducts shown in Figs. 279 and 280 are present.

A very small rubber tube is sutured with plain catgut (Fig. 278) to the ligated stump of the cystic duct to take care of a possible leakage from the same. Three strips of 2-inch wide gauze are placed around the common duct T-tube, one of these strips being placed well down into Morison's pouch over the right kidney.

Fig. 278.—*4*, Sutures of fine chromic gut (00) inserted through edges of incision in common duct in order to close same around T-tube. Latter anchored to wall of duct by plain catgut suture shown between the other two. *5*, Appearance of common duct with incision closed and tube in place. *6*, Same as *5*, but showing cystic duct ligated close to common duct after removal of gall-bladder and cystic duct.

Removal of Drains.—The gauze strips are pulled out at the end of eight days and a single narrow one put in their place. The T-tube is allowed to remain from fourteen to twenty-one days, and can be easily removed at that time, and it will do no harm if it remains even longer. I have never encountered a
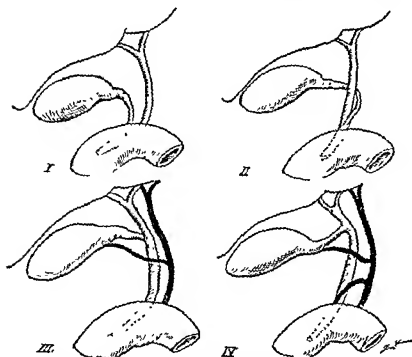
Fig. 279.—Variations in mode of union of cystic and hepatic ducts (Ruge) *I*, Cystic and hepatic ducts have a parallel course and unite behind duodenum *II*, The cystic duct winds around hepatic duct and unites with it upon its anterior wall. *III*, The cystic duct unites with hepatic duct upon its posterior wall. *IV*, Cystic duct unites with hepatic duct at an obtuse angle with its long front caudal axis instead of at an acute angle, as is shown in figure. Note two anomalous vessels passing across common duct, one as cystic artery to gall-bladder and the other across duct at lower end

case, in nearly forty choledochotomies, where the tube could not be removed by employing *gentle* traction, and have never seen a common duct fistula follow its employment

Operative Findings.—After carefully separating the adhesions of the omentum and duodenum to the bed from which the

gall-bladder and cystic duct had been removed, I now expose
to your view that portion of the common duct which the surgeon

Fig. 280.—Variations in course of cystic artery and blood-supply of retro-
duodenal portion of common duct *I*, Normal course of cystic artery and normal
mode of union of cystic and hepatic ducts *II*, Variations in course of cystic
artery. The most frequent is shown in black, while anomalous ones are shown
in cross-hatched outline *III*, Great vascularity of retroduodenal portion of the
common duct, duodenum being pulled downward (Del Branco)

is accustomed to palpate—viz., the supraduodenal portion. I
have just called your attention to the fallacy of saying that the

common duct contains no stones when the surgeon finds this portion negative to palpation. The common duct in this patient is the size of two adult thumbs, and its walls are very
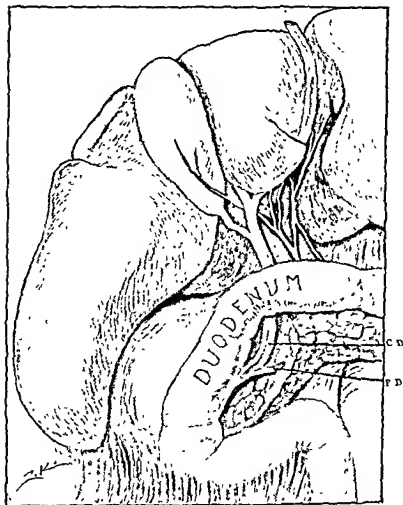
Fig. 281—Topographic relations of common (C D) and pancreatic (P D) ducts to duodenum and pancreas (Zuckerkandl)

thick and rigid On palpating through the intact wall of the duodenum I can feel a hard body like a calculus firmly impacted in the ampulla of Vater. We will now open the common

duct between two traction sutures in the manner just described (Fig. 277). A large quantity of thin, clear yellow bile escapes. The common duct easily admits my index-finger, and the same is true of both right and left hepatic ducts (Fig. 281). The latter, as well as all of the common duct as far down as the am-
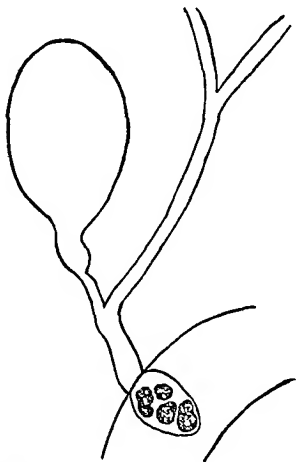
Fig. 282.—Calculi lying in common duct which were overlooked at previous drainage and subsequent removal of the gall-bladder (see text). One calculus projected through and obstructed the papilla of Vater

pulla, contain no calculi, but just above the ampulla I find and present to your view two calculi about the size of peas, and wedged firmly into the ampulla and projecting about one-half of its length through this structure is a calculus about the size of a navy bean (Fig. 282). After removal of these calculi the tip of the little finger can be easily passed through the ampulla

into the duodenum. A T-tube is inserted into the supraduodenal portion of the common duct, and held in place in the manner previously described and surrounded by three gauze drains. The abdominal incision which passed through the inner third of the right rectus muscle (Fig. 276) exposed, as you have just seen, in a most beautiful manner all of the principal bile-ducts.

Postoperative Notes.—Immediately following the operation the icterus and fever disappeared rapidly, and the patient made an uneventful recovery and was discharged from the hospital with wound healed at the end of six weeks.

The instructive feature about this case is the fact that in spite of negative palpation of the common duct at both of the previous operations, three calculi were found which had evidently been present at the time of the previous operations This shows the necessity of our opening the common duct more frequently in the future than has been our custom in the past. By doing this under certain indications I have had far fewer recurrences. During the past four years, in the course of a large number of operations on the biliary passages, I have explored the common and hepatic ducts in 30 cases in which palpation was negative. In 10 (33.3 per cent.) of these, calculi[1] were found on exploration in spite of negative palpation. None of these 30 patients died, and I am confident that the mortality will not be increased in the hands of other surgeons if a rapid technic for exploring the common and hepatic ducts is developed by the surgeon

Of the four indications given by Kehr, three have seemed to me of especial importance, in the order named· (1) The presence of many small calculi in the gall-bladder or cystic duct; (2) an enlarged, thick-walled common duct; (3) the presence of chills, fever, or icterus. To these I would add a fourth—recurrence of pain or symptoms of cholangitis (chills, fever, etc.) after previous operations, such as drainage or removal of the gall-bladder, or even after previous choledochotomies. In 2 of my 10 cases

[1] In 6 cases the common duct calculi were of such size as to render it improbable that they would have passed into the duodenum spontaneously.

with positive findings (although even my palpation had been negative) operation had been performed by other surgeons.

In one of these the gall-bladder had been explored without finding calculi and then drained. Eighteen months later the patient began to have pain in the right hypochondrium with icterus, and I operated on him. The gall-bladder walls were thick, but no calculi were found. The common duct was of the size of two adult thumbs, thin-walled and negative on palpation. On exploration of the common duct a calculus the size of a navy bean was found just above the ampulla.

In the second case the greatly thickened gall-bladder, containing a large calculus impacted at its neck, had been removed by one of my colleagues. Two years later the patient began to have pain in the epigastrium, icterus, chills and fever. I found the common duct greatly enlarged, and although palpation was negative, two faceted calculi, the size of a navy bean, were found just above the ampulla. In neither of these cases were any symptoms referable to the common duct calculi present at the time of the primary operation, and there has been no recurrence since the secondary one.

The chief indication for opening the common duct in 8 cases in spite of negative palpation was the presence of many small calculi in the gall-bladder. In all of the 8 cases of positive exploration after negative palpation the number of calculi in the gall-bladder varied from 20 to 300.

In 3 cases the common duct calculi were the size of a pea, faceted, and 15 in number. In the majority of the 10 cases the calculi were found in the retroduodenal portion of the duct. In 2 cases a number of small calculi of the same size and composition as those in the gall-bladder and common duct were either found in the hepatic duct or escaped in a perfect shower from this duct while the edges of the opening in the common duct were retracted. In one of these patients there has been a recurrence of symptoms in spite of a cholecystectomy and choledochotomy with removal of calculi from the common duct.

I can now add this third case which you have seen today

into the duodenum.   A T-tube is inserted into the supraduo-
denal portion of the common duct, and held in place in the
manner previously described and surrounded by three gauze
drains.   The abdominal incision which passed through the
inner third of the right rectus muscle (Fig. 276) exposed, as you
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bile-ducts.

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an uneventful recovery and was discharged from the hospital
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previous operations, three calculi were found which had evi-
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recurrences.   During the past four years, in the course of a
large number of operations on the biliary passages, I have ex-
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pation was negative   In 10 (33 3 per cent.) of these, calculi[1]
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to the other two where secondary operations were necessary for stones which had undoubtedly been present at the time of the first operation When we recall the fact that 1 in 5 cases of common duct calculi do not show the symptoms hitherto considered characteristic and even indispensable to the diagnosis of calculi located in the common or hepatic ducts, or both, we can readily see that a more thorough operation is necessary in the future. Deaver, in a recent paper, states that he has overlooked common duct stones in 5 of 33 cases of simple drainage, and even in 1 case after removal of the gall-bladder. Since finding common or hepatic duct calculi in 3 of my own cases either drained or cholecystectomized by other surgeons, and, furthermore, since I have found common duct calculi in a total of 11 out of 32 cases where I opened the common duct upon the indications given above, I have become convinced of the necessity for the addition of common duct exploration with subsequent drainage in many more cases than in the past.

CLINIC OF DR. DAVID C. STRAUS

MICHAEL REESE HOSPITAL

STRANGULATED APPENDIX IN A FEMORAL HERNIA; APPENDECTOMY THROUGH FEMORAL INCISION

Summary: A patient presenting the history and physical signs of a strangulated femoral hernia; reduction of a strangulated hernia should never be attempted if there is the slightest reason to believe that gangrene may have begun—always operate, choice of anesthetic; technic of the exposure of a gangrenous hernial sac; management of the strangulated, gangrenous appendix in the present case; radical cure of femoral hernia by means of two mattress-sutures including in their bite Poupart's ligament, the pectineal fascia, the pectineus muscle, and the periosteum of the horizontal ramus of the pubic bone; precautions to be observed.

THIS patient, a female fifty-six years of age, came to the hospital because of a painful swelling in the right femoral region.

She states that several months ago she first noticed a bulging in the right femoral region. This was never very large, caused her no discomfort, and she paid little attention to it.

Six days ago she slipped on the sidewalk and immediately began to have discomfort in the right thigh, and noticed that the bulging in the femoral region had become larger and was tender. The symptoms were not marked until yesterday, twenty-four hours before her entrance into the hospital, when the mass became painful.

There has been no vomiting at any time and no nausea.

On admission a short time ago her temperature was 100° F., pulse 104, and respirations 28. The physical examination is negative except for the swelling in the right femoral region. The abdomen is lax and shows no rigidity whatsoever. Examination of the liver and the spleen shows these to be entirely negative. There is no tenderness over the gall-bladder region or over the region of the appendix. I would like to call your attention to this firm, oval mass, about the size of a hen's egg,

to the other two where secondary operations were necessary for stones which had undoubtedly been present at the time of the first operation. When we recall the fact that 1 in 5 cases of common duct calculi do not show the symptoms hitherto considered characteristic and even indispensable to the diagnosis of calculi located in the common or hepatic ducts, or both, we can readily see that a more thorough operation is necessary in the future. Deaver, in a recent paper, states that he has overlooked common duct stones in 5 of 33 cases of simple drainage, and even in 1 case after removal of the gall-bladder. Since finding common or hepatic duct calculi in 3 of my own cases either drained or cholecystectomized by other surgeons, and, furthermore, since I have found common duct calculi in a total of 11 out of 32 cases where I opened the common duct upon the indications given above, I have become convinced of the necessity for the addition of common duct exploration with subsequent drainage in many more cases than in the past.

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hernias. However, the vertical incision appears to be better suited to this case. After cutting through the skin and superficial fascia the mass is exposed, and we find it to be dusky red-brown and very friable. This apparently consists chiefly of fat covered by a thin membrane, resembling peritoneum. One might easily mistake the fat for omentum and the thin fascial covering for peritoneum—*i. e.*, sac. However, as this picture is met with frequently in femoral hernias, we are not deceived, but recognize it to be subperitoneal fat covered by a thin layer of fascia, which, anatomically, is composed of the wall of the femoral sheath (if the hernia has not pushed through one of the apertures in this) and the cribiform fascia or a thin layer of the fascia lata, which have become fused and stretched, and, therefore, present the appearance of a thin membrane and can easily be mistaken for peritoneum. This mass having been exposed, an assistant holds it securely so that none of the contents can slip back into the abdomen. *This is a most important point in strangulated hernia operations*, for if a gangrenous loop of bowel or a gangrenous piece of omentum slips back into the abdomen it is imperative that it be found and removed, because if it should be allowed to remain in the abdomen the patient would in all probability develop peritonitis. Such a search may necessitate opening the abdomen through a separate incision, and, in any event, considerably complicates and prolongs the operation. This is particularly to be avoided in a patient with a strangulated hernia, as such a patient is usually in poor condition.

To return again to our operation: Next, the *aponeurosis of the external oblique is exposed above Poupart's ligament, well beyond the mass,* and the aponeurosis is followed down until the neck of the sac is reached. This is a simple method of getting into the proper line of cleavage in any difficult hernia operation. When this is accomplished the remainder of the operation is greatly facilitated. The neck of the sac having been reached, an assistant holds it between his thumb and index-finger to prevent any escape of the contents while the sac is separated from the surrounding tissues. In doing this particular care is taken not to injure the femoral vein which lies immediately lateral to it, and

also not to injure the internal saphenous vein which empties into the femoral, coming up from below (Fig. 284). The various structures exposed now being easily identified, a blunt retractor is introduced at the upper margin of the femoral ring and Poupart's ligament is strongly retracted upward, completely exposing the neck of the sac. The right index-finger is now introduced and the neck of the sac is completely freed all around. Having freed the entire mass, and having surrounded it with moist gauze pads to prevent soiling the adjacent tissues, we incise the fascia and expose the subserous fat, which is found to be very friable and suffused with bloody serous fluid—that is, it is gangrenous. On very cautious dissection of the subserous fat the true hernial sac—that is, the peritoneal sac—is finally come down upon. This is now opened, and we find it is thickened—edematous. It contains a little foul, bloody, serous fluid, and just one other thing: *The only structure in this sac is the distal end and tip of the appendix, which is gangrenous* (Fig. 283). We will now amputate the sac at the neck, thus removing all the gangrenous portion before we deal with the appendix. In doing this, artery forceps are clamped all about the edges of the remaining part of the neck of the sac so as to prevent it from retracting up out of reach. We now grasp the tip of the appendix and draw it gently downward, so that the entire appendix and lower end of the cecum are brought into the field of operation. It is surprising how readily this is done. After removing the appendix in the usual manner the cecum is returned into the abdomen, and the peritoneum is closed with a circular purse-string of plain catgut. *This closure we will reinforce* by tying a separate ligature of catgut proximal to the purse-string. The stump is now dropped and allowed to retract.

We will undertake the *radical cure of the hernia.* Two mattress-sutures of No. 2 chromic catgut are introduced so as to sew down Poupart's ligament to the pectineal fascia. The sutures are introduced so as to grasp, at the same time, the pectineal fascia, pectineus muscle, and the periosteum covering the horizontal ramus of the pubic bone. Each suture is threaded with two needles, one at each end. These are short, heavy, full-

curved needles. Each needle is passed first through the edge of
Poupart's ligament, from above downward, taking a good bite of
the edge, and then perpendicularly through the pectineal fascia,

Fig 283 —The specimen consists of two parts Above is the appendix with
the mesenteriolum attached At the upper extremity of the appendix the area
crushed by the clamp can be plainly seen At about the junction of the middle
and lower thirds, the area of strangulation of the appendix and mesenteriolum is
seen as a dark constricted transverse zone Below this the distal end and tip of the
appendix are seen to be distended and discolored The tip of the appendix curves
slightly upward to the left, so that the lower extremity of the appendix does not
represent the tip Here the dark area seen in the photograph is due to a dark red
fibrinous exudate covering this gangrenous area of the appendix The lower half
of the specimen consists of the peritoneal sac with a very large amount of sub-
peritoneal fat This entire mass is greatly discolored and is gangrenous The
funnel-shaped area just beneath the end of the appendix, which is only slightly
larger than this strangulated portion of the appendix, is the peritoneal sac All
the rest of the specimen is subperitoneal fat (.1).

and on down through the pectineus muscle until the bone is
reached, and here a good bite of the periosteum is taken and the
needle is then curved sharply upward, so as to grasp a good hold
of the pectineus muscle and pectineal fascia In this way the

loop of the mattress-suture is made to lie above Poupart's ligament, while the two free ends come out below on the pectineal fascia. Both mattress-sutures are introduced before either is tied In introducing the mattress-sutures care is taken not to
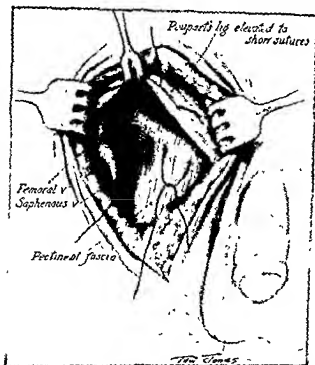
Fig 284 —Drawing to show how the femoral ring is closed by suturing Poupart's ligament down to the pectineal fascia, pectineus muscle, and periosteum of the superior ramus of the pubis The drawing has been made somewhat diagrammatic so as to make it clear how the sutures are inserted. The incision is shown longer than at operation, and Poupart's ligament is held upward in order to show how the sutures, after passing through Poupart's ligament, are passed down through the pectineal fascia until the bone (horizontal ramus of the pubis) is reached, and then, grasping a bite of the periosteum, are carried upward through the pectineus muscle and pectineal fascia, on the surface of which the knots come to lie.

have the loop lie parallel to the margin of Poupart's ligament. This is accomplished by introducing one needle further from the free margin than the other. In this way the loop comes to lie obliquely, and grasps a bundle of fibers and so will not tear out, and at the same time secures a wide area of contact between

Poupart's and the structures beneath it. The periosteum covering the superior ramus of the pubic bone is strong and gives a firm hold to the stitches. This method of introducing the sutures, having the additional strength of the strong periosteum, gives a more secure closure than merely uniting Poupart's to the pectineal fascia alone. Before tying the sutures it is well to test that they have a strong hold. In some individuals the pectineus muscle does not extend laterally as far as the femoral vein. There is a gap here where the horizontal ramus of the pubic bone is covered by the pectineal fascia and periosteum only. These suffice to give a good hold to any stitch that is inserted. In introducing the stitches great care is taken not to puncture the femoral vein, the saphenous vein, or the femoral artery. We have placed the first suture close up against Gimbernat's ligament. The second, or lateral suture, lies just alongside the first, and we are taking care not to place it too close to the femoral vein. The internal of the two sutures is tied first, and in tying the second, or lateral suture, care is taken not to compress the femoral vein. This must always be carefully guarded against. One mattress-suture usually suffices to effect a satisfactory closure. In other cases an additional single interrupted stitch may be required (Fig. 284). It is rarely necessary to use two mattress-sutures. Before being satisfied with the closure, however, it should be tested with the index-finger.

We are inserting a soft-rubber drainage-tube down to the closed ring, and are closing the skin with a black waxed-silk running suture, which we are interrupting once or twice so that a portion of it may later be removed in case more drainage seems indicated.

Note.—Recovery was uneventful. There was a slight amount of discharge for a few days only. On the fifth day after the operation the drainage-tube was replaced by a plain gauze drain, and after the sixth day no more drainage was used.

The patient was kept in bed until the thirteenth day, when she was allowed to be up in a wheel chair. I keep all hernia cases in bed for at least ten days as a routine and very fleshy patients are kept in bed for a few days longer. The patient

walked on the twenty-first day and was discharged on the
twenty-second day.

While this case is not unique, strangulation of the appendix
in a femoral hernia is extremely infrequent. Without attempting
to review the literature on this subject, it may be of interest to
know that Alti, in his thesis,[1] gives an excellent account of
hernias of the appendix with a full bibliography. He discusses
cases of strangulated appendix in a femoral hernia reported by
Schwartz,[2] Pollosson (3 cases),[3] and Brieger (several cases).[4]
Brieger reviews all the cases reported from the time of the
appearance of Klein's monograph, "Uber die ausseren Bruche
des processus vermiformis coeci," Giesen, 1868 up to 1893.
During these twenty-five years Brieger found there were
but 15 cases of hernia of the appendix alone in femoral
hernias. Of these, 3 cases were irreducible but not strang-
ulated.   In 10 cases there were symptoms of strangula-
tion. In some of these 10 the appendix was gangrenous In
others gangrene had not yet developed. In the remaining 2
cases no accurate description was given. In 1911 Paul Oliver,[5]
of Chicago, reported a case of strangulation of the appendix
alone in a femoral hernia. There was no case of strangulation
of the appendix in a femoral hernia observed during the year
1916 and only one case was reported during 1915. This case,
reported by Downes,[6] was practically identical with the case
you have just seen. Girolamo[7] in 1914 wrote an excellent and
comprehensive article on hernias of the appendix in general, and
completes his article with a very full bibliography.

[1] L'Appendice iléo-cœcal et ses hernies, Paris, 1894. (Available at the Sur-
geon General's Library, Washington)

[2] Hernie crurale étranglée et enflammée de l'appendice iléo-cœcal, Rev. gén.
de chir, 20, p 313.

[3] Etranglement herniare de l'appendice iléo-cœcal et son traitement, Lyon
méd, 23 mai, 1893

[4] Hernies de l'appendice vermiculaire, Arch fur klin Chir, 1893, Bd xlv, p 892
_ _ 1 _ 16 1911 1 m 25 1969

Only Annals of

med Napoli, 1914,

CLINIC OF DR. ARTHUR H. CURTIS

St. Luke's Hospital

REMARKS ON LEUKORRHEA

Summary · The nature of leukorrhea—types of secretion, places of formation, the cervix, urethra, Skene's ducts, and Bartholin glands chiefly concerned, the fallopian tubes and endometrium rarely the source of the discharge, pathogenesis of leukorrhea, gonococcus pre-eminent, lacerations and systemic disease of secondary importance, treatment· necessity of ascertaining all direct and predisposing causes, value of silver nitrate, formalin, radium, and "dry" treatment, status of vaccine therapy

LEUKORRHEA, according to its accepted meaning, includes any excessive discharge from the vulvovaginal canal.

The discharge is either mucoid or purulent in character. A mixture of mucus and pus in various proportions is common Great variation in the consistency of purulent discharges is also found; the more thin and watery the pus, the more severe and more persistent, as a rule, is the infection.

Normal vaginal secretion (Fig. 285) is acid, in leukorrhea the reaction often becomes neutral or alkaline.

Where Discharges May Arise.—There is much indecision on this point, which renders difficult any agreement on the causes or treatment of leukorrhea It therefore seems desirable to give this topic most detailed attention.

For the sake of thoroughness we will consider all pelvic organs which might be involved.

The Fallopian Tubes.—Because of the downward and outward inclination of the tubes, we know they do not persistently drain their contents into the uterus That would be mechanically almost impossible. If the tubes are ever responsible for leukorrhea it must be a secondary responsibility through repeated reinfection of the uterus.

walked on the twenty-first day and was discharged on the twenty-second day.

While this case is not unique, strangulation of the appendix in a femoral hernia is extremely infrequent. Without attempting to review the literature on this subject, it may be of interest to know that Alti, in his thesis,[1] gives an excellent account of hernias of the appendix with a full bibliography. He discusses cases of strangulated appendix in a femoral hernia reported by Schwartz,[2] Pollosson (3 cases),[3] and Brieger (several cases).[4] Brieger reviews all the cases reported from the time of the appearance of Klein's monograph, "Uber die ausseren Bruche des processus vermiformis coeci," Giesen, 1868 up to 1893. During these twenty-five years Brieger found there were but 15 cases of hernia of the appendix alone in femoral hernias. Of these, 3 cases were irreducible but not strangulated. In 10 cases there were symptoms of strangulation. In some of these 10 the appendix was gangrenous. In others gangrene had not yet developed. In the remaining 2 cases no accurate description was given. In 1911 Paul Oliver,[5] of Chicago, reported a case of strangulation of the appendix alone in a femoral hernia. There was no case of strangulation of the appendix in a femoral hernia observed during the year 1916 and only one case was reported during 1915. This case, reported by Downes,[6] was practically identical with the case you have just seen. Girolamo[7] in 1914 wrote an excellent and comprehensive article on hernias of the appendix in general, and completes his article with a very full bibliography.

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[4] Hernies de l'appendice vermiculaire, Arch fur klin Chir, 1893, Bd. xlv, p 892

[5] Jour. Amer. Med Assoc, December 16, 1911, lvii, 25, 1969

[6] Strangulated Femoral Hernia; Sac Containing Appendix Only. Annals of Surgery, 1915, lxi, 355-357.

[7] L'ernia dell'appendice vermiforme del cieco. Riforma med. Napoli, 1914, xxx, 503, 546

remained somewhat open. Most of you probably feel inclined to the belief that this is a tissue frequently subject to chronic infection. You should know of the experiences of Kelly's clinic at John Hopkins. In a histologic study of endometria from 800 pathologic cases in that clinic, Cullen was able to find evidence of endometritis in only 49. Similar evidence from histologic study has been obtained by Charles Norris.
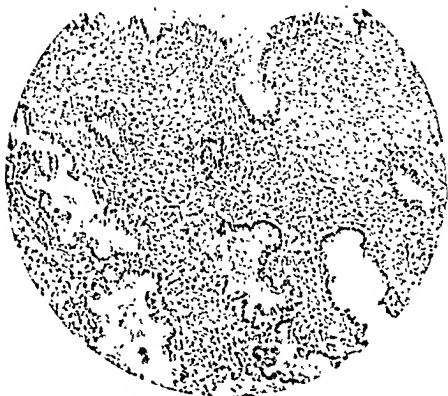
Fig 286.—Mucous secretion from normal premenstrual endometrium.

From personal work I am satisfied that bacteria are infrequent in the body of the uterus in chronic pelvic disease. In a study of the bacteriology of the uterus I have been removing the greater part of the endometrium, and have made cultures not only from smears of the surface, but from the entire crushed and ground material from each case. This work has convinced me

that the body of the uterus is to be thrown out of consideration as a common source of chronic infectious discharges

The Cervix.—Now we come to a region below the internal os This tissue is open to invasion from the outside. It has no real barrier against infection The cervix is exposed to direct infection at intercourse, is washed in a mixture of desquamated vaginal

Fig 287 —Section through diseased cervix of patient with chronic leukorrhea An infiltration with plasma cells and polynuclear leukocytes, as here shown, is typical of these cases

epithelium and bacteria, is exposed to various irritating douches, is subjected to digital manipulation, and is bruised and torn at the time of labor

The glands of the cervix continuously secrete mucus Any of the factors just mentioned have the power and the tendency to increase the number and the activity of these glands From

the cervix, therefore, excessive mucous discharges originate, and they tend to persist until destruction or lessened activity of the glands occurs.

Likewise, being virtually a part of the vaginal canal as far as accessibility to bacteria is concerned, the cervix is easy prey for infection. It follows that purulent discharges may also originate here (Fig. 287).

The *vaginal wall*, covered with squamous epithelium, is little subject to infection. It is seldom the source of chronic inflammation except in asthenic conditions, *e. g.*, in the aged

Fig 288 —Smear of pus-cells and gonococci from abscess sac in Skene's duct. A common focus of infection in patients with chronic discharge.

and in diabetics. The vagina serves mostly as a gathering place for bacteria and for accumulation of discharges, the part it plays is chiefly a passive one.

The *urethra* and *Skene's ducts* are frequent foci for the generation of leukorrheal pus. At this time I have under observation a case in which splitting open an infected Skene's duct was promptly followed by cessation of a long-standing creamy vaginal discharge. Abscess sacs formed in Skene's ducts. having origin in gonorrheal infection of the ducts, are among the frequent contributors to chronic leukorrhoea (Fig 288).

The *glands of Bartholin* seem less concerned with the causation of leukorrhea. This may be because drainage from them is less free when they are infected.

Resumé—Let us group these facts together.

Leukorrheal discharges from the body of the uterus are not common. When present they are rarely purulent, periodic mucoid discharge may occur either as a result of excessive premenstrual mucus formation, or under pathologic conditions which create similar changes in the endometrium

Fig 289—Smear from a patient with profuse acute "non-specific" leukorrhea. Much pus and a pure growth of Gram-positive bacilli were found. Infections such as this are not rare

The cervix is a frequent seat of leukorrhea formation, whether mucoid or purulent. The urethra and Skene's ducts, especially the latter, rival the cervix as foci from which purulent discharges arise, it is common for all three to be infected simultaneously. The Bartholin glands seem a less frequently responsible source of leukorrhea.

Pathogenesis of Leukorrhea.—In the bacteriology of leukorrhea the gonococcus stands out preeminently. It is the underlying cause of most purulent discharges of women who have not borne children. In chronic cases the gonococcus cannot

often be isolated. Very frequently probably it has died out. But the gonococcus causes the original discharge, irritates and decreases the resistance of the tissues, and in these ways prepares the soil for mildly virulent bacteria, which thereafter successfully resist every effort of nature to rid herself of their presence. That exceptional, severely acute, "non-specific" cases do occur, however, must always be borne in mind. We should not diagnose acute gonorrhea without microscopic control (Fig. 289).

In parous women the course is analogous, but the method differs. Childbirth takes the place of the gonococcus. The soil is prepared through such factors as laceration of tissues, continued passive congestion, and increased cervical secretion resultant from lacerations and erosions. In these tissues, with resistance below par, the mildly virulent bacteria again find conditions favorable for their work.

There remain less important groups of cases neither the result of childbirth nor due to invasion of the gonococcus. Their cause is chiefly decreased local resistance. For this a systemic derangement, such as tuberculosis or diabetes, may be responsible, more often there is pelvic pathology with passive congestion or exudate.

It is not to be denied that virulent organisms other than gonococci may attack these regions when the tissues are normal. But in a large series of cases, with painstaking bacteriologic studies, I have seen little evidence of this. Streptococci, notably anaerobic streptococci (Fig 290), are found here, but they lack toxicity for animals. Moreover, the streptococcus is just as frequent in postgonorrheal leukorrhea as in those of other etiology. Small Gram-negative anaerobes, which are most frequent and most numerous of all, also appear to be non-virulent. Other bacteria are chiefly anaerobes, all are evidently harmless for laboratory animals.

Treatment.—What is to be done with a patient who complains of a chronic discharge?

A history and thorough examination are always in order. Any gross pelvic lesion which maintains congestion may be responsible for leukorrhea This includes extensive lacerations,

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Resumé.—Let us group these facts together

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Into *infected Skene's ducts* 20 per cent. silver nitrate is introduced on a probe. If resistant to cure, the ducts are threaded on the blunt end of a needle, the tract split open, and the lining cauterized.

Chronic urethritis seldom persists after duct cauterization. Dilatations of the urethra and weak silver nitrate instillations may be needed.

The *cervix* has been a bugbear. Plastic operations are good for little except mucous discharge from erosions. Complete amputation is a serious operation, to be undertaken only as a last resort. This limits treatment to local applications.

Most notable of favorite remedies are iodin, silver salts, and the actual cautery, all of which have had many adherents. It is my belief that pure formalin is superior to all these. As claimed by Menge, formalin evidently possesses remarkable penetrating powers. Several uterine applicators are wound with thin wisps of cotton, dipped into formalin, and each in turn introduced up to, or slightly beyond, the internal os. Applications are painful unless most carefully made, and cotton packing behind the posterior lip is required for protection of the vagina. Treatment once or twice weekly may be extended over several weeks' time.

Radium.—In the event of unsatisfactory results with formalin, radium is advisable. My experience with it thus far has been very gratifying. It is best administered under gas anesthesia. After thorough dilatation of the cervix, 50 milligrams, screened with 1 mm. platinum and encased in a finger-cot, are inserted *up to the level of the internal os.* A suture placed through the external cervix, and including the outermost end of the finger-cot, holds the radium in position. It is allowed to remain for fourteen to eighteen hours.

Other measures available in combating leukorrhea include "dry" treatment and the use of vaccines.

Dry treatment consists in carefully cleansing the cervix and vaginal canal with cotton, followed by application of powder. The chief virtue of this treatment consists in keeping the parts dry for long enough periods to permit them to return to a con-

dition of normal resistance. The powders chiefly used are aluminum acetate, or aluminum acetate with kaolin and talcum. Various remedial agents, notably iodin, silver nitrate, hydrogen peroxid, and yeast, are often added.

My attitude concerning *vaccines* is the following:

If diplococci appear numerously in smears, and grow in streptococci in preponderance in cultures, an autogenous streptococcus vaccine should be made.

Provided any other organism occurs almost exclusively in fresh smears and in cultures, it should be made into vaccine.

In other instances, if the discharge is highly purulent or watery, with no organism in predominance, a composite vaccine is made. This is secured by inoculation of a basket of tubes *directly from the patient* These are cultured anaërobically and washed off for vaccines. The usual method of making vaccines from subcultures of the original growth is worthless. Such tubes in subculture are overgrown by rapidly multiplying forms of bacteria, hence vaccines made from them do not satisfactorily represent the vaginal flora against which vaccination is directed

My present belief is that vaccines are helpful As an adjunct *to other measures they are to be advocated.* But they should be thoroughly representative of the leukorrheal flora and prepared with painstaking technic.

In supervision of the general health, careful regulation of the bowels is to be closely watched, it is a factor of more than usual importance. Most patients do best on a diet with limited meat, abstinence from alcohol, and avoidance of all seasoning except salt.

To a certain number the outlined treatment does not bring relief. Such patients find helpful the *nightly insertion of vaginal* suppositories containing 3 grains of hydrastis. Douches, evidently devoid of curative value, may be permitted for relief of discomfort; it should be explained that they tend to increase the amount and duration of the discharge.

CLINIC OF DR. PHILIP H. KREUSCHER

MERCY HOSPITAL

SEMILUNAR CARTILAGE: FRACTURE-DISLOCATION AND FRAGMENTATION

Summary: Gross pathology of internal derangement of the knee-joint; causes of the disorder—illustrative case histories, the diagnosis; treatment—futility of palliative measures—the operative technic, after-treatment.

History.—This patient, a male aged thirty-eight years, was admitted to Mercy Hospital because of trouble in his left knee joint. Previous and personal histories are negative.

The present trouble began twelve years ago while he was playing football. He stepped into a hole, severely wrenching his left knee. The pain was intense, and it was only after some manipulation that he was able to walk. The next day the swelling was considerable and there was a great deal of stiffness present. For six months following the accident he was not without pain in the knee-joint for more than a few hours at a time. One day, while walking on the street, he twisted his body and noticed that something snapped in the left knee. The knee was locked and would not extend until after considerable manipulation. Such attacks came on quite frequently, and each time he would be incapacitated for two or three days following the accident. The knee swelled immediately, and there was a localized soreness on the inner side of the knee. The last locking was three months ago.

Comments.—One of the most frequent lesions in or about the knee-joint, which may not be recognized when the patient is first examined, is semilunar cartilage disease. There may be present a simple dislocation of part or all the semilunar cartilage or there may be a dislocation and fracture, so-called fracture-

dislocation, of the cartilage; again, one frequently finds fragmentation of portions of the cartilage without any separation of the external attachments of this body (Fig. 291). Etiologically several types are recognized: First, fracture or dislocation, due to direct external trauma; second, malposition or fragmentation of the cartilage, due to internal trauma, for instance, very quick twisting or flexion of the knee-joint under weight; third, we may
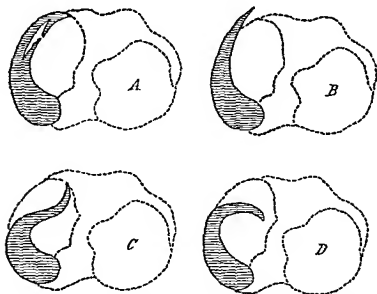
Fig. 291.—*A*, Internal cartilage crushed by pressure between femur and tibia; *B*, separation of anterior attachments of cartilage by forcible extension; *C*, position of separated cartilage on full extension; *D*, separated anterior end of cartilage lying between fibula and tibia on full flexion (Walton)

find loosening and fraying of the cartilage, due to chronic synovitis or osteo-arthritis.

Patients doing actual manual labor, such as coal-miners and those pursuing athletic sports, especially football, most frequently present themselves with this lesion. The internal semilunar cartilage is injured most frequently. Various authors give the proportion as 20 internal to 1 external. Rutherford Morrison, of Newcastle, places the proportion of internal semilunar cartilage injuries as 50 to 1 of the external Walton,

in the British Medical Journal, reports 85 cases, 81 of which
were internal. Martin, who has treated 449 cases, found that
92 per cent. were internal. His cases were mostly coal-miners,
and he found that in 95.5 per cent. there were fractures and tears,
and that only 4½ per cent. showed no definite pathology, prob-
ably a loose cartilage.

The mechanism of the injury as seen in coal-miners is
easily understood. The patient, working in a stooped position
and using his knee as a fulcrum for his shovel-handle, suddenly
twists the femur upon the tibia in such a way as to loosen the
semilunar cartilage. If this occurs frequently, the continued
pinching of the edge of the cartilage causes a fraying or a frag-
mentation of the cartilaginous substance. In other cases there
is a sudden, unexpected trauma to the internal portion of the
upper end of the tibia, which causes loosening and occasionally
a fracture of the anterior half of the cartilage. A typical history
of this type was given by a patient, a male, thirty-eight years
of age, who had struck the inner side of his knee against a chair.
The traumatized area felt a little sore and painful for a few days,
but was not swollen or inflamed. After some weeks the patient
noticed that the knee became tired when he walked for any
length of time. There was very little trouble for a period of
months, until one day while walking he twisted his knee slightly
and noticed a sudden slip in the knee-joint, which was attended
by some pain. The knee was in a flexed position, and he found
that he could not extend it. It was "locked." After some ma-
nipulation the knee became "unlocked" and the patient went
about as before. Subsequently he had seven or eight attacks
of the locking, which occurred most commonly when he twisted
the femur on the tibia under his weight with the knee slightly
flexed, as when attempting to go upstairs. So frequently did
this accident occur that the patient became totally incapacitated.

Here is another history typical not of a primary external
trauma, but of an internal injury to the knee-joint. The patient,
a female aged thirty-five years, without any previous history of
trauma or trouble with the knee-joint, on arising from a chair
suddenly twisted her knee and was immediately seized with an

acute pain on the inner side of the knee-joint. The joint was locked and only after considerable *manipulation and rubbing* could she move it again. She said she felt something slip out of the joint as the pain came on. Two hours later, while walking in the street, the same accident happened. The knee was swollen and painful for about two weeks, during which time she rested and did not use her limb at all. After getting up and about she had repeated attacks of pain and locking and became practically incapacitated.

Let us analyze this history. The sudden twist undoubtedly *loosened the anterior portion of the internal semilunar cartilage* and caused it to slip out of the knee-joint and become palpable *under the skin*. After some massage and manipulation this tip slipped back into its position, only to be forced out again at the next twisting motion of the knee. *At the operation in this case* it was found that the cartilage was not fractured, but loosened to such an extent that it slipped in and out of the joint very freely.

Stab or puncture wounds about the knee-joint may frequently fracture or separate a portion of the cartilage from its attachment. Such a case came into Dr Murphy's service in 1914 with the following history: At the age of eight years the patient, a female, fell and struck upon a broken bottle, cutting a deep gash just internal to the patella. For sixteen years the right knee would become locked at intervals, so that she would be unable to walk and would have to go to bed for relief. The knee sometimes remained locked for from three to ten days at a time. It is interesting to note that the unlocking always occurred during sleep, that is, at the time when there was complete relaxation of the muscles about the knee-joint. This accident happened so frequently that it was only with extreme care while walking and getting up from a sitting posture that she was able to be up and about. Unfortunately, this patient was in a run-a-way accident some years later and was thrown from a carriage, falling with her full weight upon both knees. Soon after this a *grating sensation* developed in the right knee. This grating gradually increased in intensity and frequently was accompanied by consider-

able pain. Because of the pain and because of the fear that the knee-joint would become locked the patient would, whenever possible, throw her weight upon her left limb, until that too began to show the same grating as the right. The knee did not lock, but there was a constant drawing feeling in the knee and in the

Fig. 292.—Pre-operative skiagram of knee-joint. Note the lipping of external edge of the femur and tibia (Murphy).

muscles of the thigh. Fixation had taken place, so that the patient could not bend the knee sufficiently to climb stairs.

This case presents two distinct lesions, but both of them, as was shown by operation, involving the semilunar cartilages as well as other structures of the knee-joint. The sequence in the right knee was trauma first, then luxation of the internal semi-

lunar cartilage, with the development of traumatic osteo-
arthritis with periosteal and cartilaginous ossification, as shown
in Figs 292 and 293. As the result of the irritation of the dis-
placed cartilage there developed a traumatic synovitis, which by
its recurrence produced thickening and then chondrification of
the capsule. The skiagrams of the left knee-joint show the oblit-

Fig. 293 —Lateral view of preceding figure. Note the osteophyte on tibia, not in
semilunar cartilage (Murphy)

eration of the space between the internal condyle of the femur
and internal tuberosity of the tibia owing to the partial destruc-
tion of the internal semilunar cartilage A hypertrophic arthri-
tis has developed, which has resulted in lipping of the tibial
tuberosities and the external condyle of the femur as shown in
Fig. 292.

As in all other joint lesions, it is very necessary that we have a most accurate case history and skiagrams from various angles before a logical diagnosis can be made. The reason so many of these cases are not diagnosed is because we do not take time to

Fig. 294.—Hypertrophic osteo-arthritis of the left knee-joint. Note lipping of external condyle of femur. Note also obliteration of space between the internal condyle of femur and internal tuberosity of tibia, owing to partial destruction of internal semilunar cartilage (Murphy).

listen to the patient's story. We are so apt to think of the more common joint lesions as we see them in our daily practice, namely, mono-articular arthritis, synovitis, tuberculosis, etc. The recurrent pains which accompany the locking are frequently so negligible that the patient does not lay particular stress upon
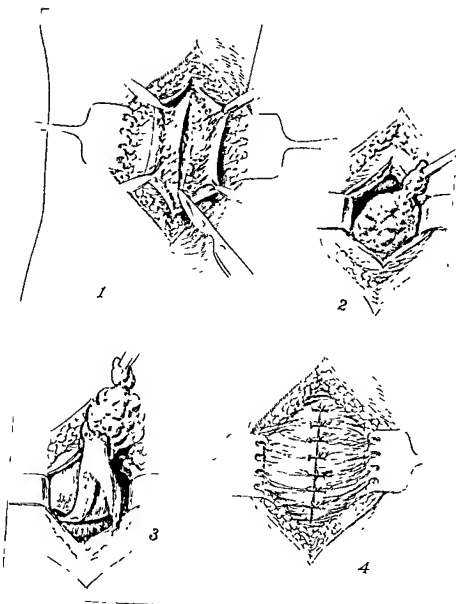
Fig 295

wound or into the joint. When the synovial capsule is opened the joint fluid often escapes very freely if the injury has been a recent one. If it is clear synovial fluid the loose or fragmented cartilage may be clearly seen in the field and grasped with a forceps and drawn outward. In the ordinary case a curved scissors frees that portion of the smilunar cartilage which still remains attached with very little difficulty. If any difficulty is encountered at all, an adduction of the leg on the thigh, in the case of an internal semilunar cartilage operation, gives one free access to the posterior portion of the semilunar cartilage attachment. Great care is exercised not to injure the surface of the joint in any way. After the cartilage is removed the edges of the synovial membrane are approximated and sutured with fine catgut. The capsule is closed with catgut and the skin sutured with horsehair and the operation is completed (Fig. 295).

The after-treatment consists in placing the leg into a straight wire cage and applying a Buck's extension with a weight of from 12 to 15 pounds, so as to keep the joint surfaces separated during the process of repair. After twelve to fifteen days active motion is permitted, and at the end of three or three and one-half weeks the patient is able to be up and about on crutches. From the statistics of those men who do careful surgery, and who do a great many operations of this kind, it can be seen that the operation for the removal of the semilunar cartilage in an uncomplicated case is most successful. The absence of the cartilage in the knee-joint interferes in no way with the function of the joint.

Following the technic outlined above we find in the case now before us that the semilunar cartilage has become detached at its anterior end and is fractured very much as shown in Fig, 291, D.

Fig. 295—Operation in a typical case of fracture of internal semilunar cartilage: *1*, Longitudinal incision to inner side of patella. The knife is shown dividing successively the fibrous, the vascular, and the synovial layers of the capsule. *2*, Retraction of edges of wound shows inflamed and thickened subpatellar fatty bursa. Its inner margin is scar-like from the frequent pinching of its villi between the bones. *3*, Upon delivering the fatty bursa the attached semilunar cartilage emerges from its position. *4*, Interrupted sutures opposing edges of capsule (Murphy). (Note: The straight incision shown in the figures was used prior to the adoption of the right-angled incision described in the text.)

We remove the cartilage in its entirety and with it a small loose body which we find just under the patella to the median side. Upon opening the joint a small quantity of free fluid escaped; there was no blood. We close the incision in layers, using our customary precautions against hand-contacting tissues.

The after-treatment which we shall apply here has already been described.

CLINIC OF DR. J. S. EISENSTAEDT

Michael Reese Hospital

MECHANICAL AIDS IN THE DIAGNOSIS OF LESIONS OF THE UPPER URINARY TRACT

Summary: A careful history and a painstaking physical examination of prime importance—mechanical aids valuable for purposes of differential diagnosis; fields of usefulness for cystoscopy, ureteral catheterization, roentgenography, ureteropyelography, and chromocystoscopy.

A great number of reports and many articles have recently appeared in the literature devoted to description and case reports of the various procedures which I wish to discuss this afternoon. You all know the various procedures and the indications for their use. However, in spite of fearing that this subject may have become somewhat worn, I hope to be able to bring some new points to your notice and emphasize the old ones.

Let us first enumerate the mechanical aids which have actually revolutionized the methods of urinary diagnosis:

1. Cystoscopic examination.
2. Ureteral catheterization.
3. x-Ray examination.
4. Combination of two or all of the above plus the injection of a fluid or the passage of an instrument which appears opaque in the x-ray plate, as:
    (a) Shadowgraph catheters, impregnated with lead or bismuth.
    (b) Placing of metal mandrin in catheter.
    (c) Pyelography, using either 40 per cent. argyrol, 10 per cent. collargol, or thorium.
    (d) Uretography.
    (e) The use of a metal ureteral catheter with resonator attachment for eliciting the presence of stones.
5. Chromocystoscopy.

It is far from my intention to underrate the painstaking history and carefully made physical examination, for without these no man, regardless of how remarkable his technical skill may be, can justly lay claim to the title of surgeon. The clinical evidence and the deductions made possible by our *mechanical aids* must each be carefully weighed before a conclusion can be reached in a complicated case. But why, then, lay such stress upon the mechanical aids? For the following good reasons:

In the first instance, stone in the kidney may be latent or *the symptoms may be referred to the opposite side*, or may pass under the guise of lesions of the gastro-intestinal tract or of the genital tract in women, or under the diagnosis of sciatica or lumbago or cholecystitis, and not infrequently may be marked by severe reflex ileus, associated with vomiting and meteorism.

Pyelitis, for example, is likewise very frequently diagnosed falsely on account of symptoms referable to other anatomic structures; cases have been reported by Lindeman, Schlesinger, Cohn, and Reiter in which the diagnosis of neuralgia in the iliac or ischial regions was made, and only later were the symptoms found to be due to inflammation of the renal pelvis. Vanderhoef reports a series of cases of pyelitis in which *the clinical course and temperature curve were identical with malaria.* Mirebeau has shown that pyelitis may produce symptoms in the female referable exclusively to the genital tract Langstein reports a case of pyelitis under the guise of a severe meningitis, and Schmidt calls attention to pain in the ileocecal region in these cases

Pyonephrosis, hydronephrosis, and tumor have equally the same eccentricities, in many cases making them difficult of diagnosis   A case came under my observation within the past three weeks which is especially instructive.   The patient, a well-nourished woman, complained over a period of *time of pain and fulness in the right renal region*   The pains were colicky in type, but never occasioned prostration   The urinary symptoms were not marked nor characteristic.   Some pus was found in a catheterized specimen from the bladder.   A distinct tumefaction was noted in the right flank, which was absolutely charac-

teristic in location, size, contour, and consistency for kidney. A competent and painstaking internist, after careful physical examination, diagnosed lesion of the right kidney, probably hydronephrosis. The patient came to operation, the kidney was exposed, and found to be normal. The case proved to be an enormous hydrops of the gall-bladder. How could such an error have been avoided? Let me add that a cystoscopic examination had been made and the bladder reported as normal. The diagnosis could have been made had all the procedures indicated been carried out in their proper sequence plus the simple inflation of the colon, which would, in all probability, have shown definitely that they were not dealing with a retroperitoneal lesion, but one within the abdominal cavity itself. Therefore, it has been my practice in all cases where there exists the suspicion of lesions of the upper urinary tract to insist upon having besides a carefully taken history, and urinalysis of twenty-four-hour specimen, including bacteriologic examination, an x-ray examination of the entire upper tract, including both kidneys, the entire length of both ureters and the bladder.

I will attempt to point out briefly what, in my opinion, the various procedures demonstrate that may be helpful in diagnosing upper urinary tract lesions.

1. *Cystoscopy*.—In the presence of an absolutely normal bladder lesions of long standing of the upper urinary tract are not common. One may, however, encounter a normal bladder picture in the presence of a simple hydronephrosis, a closed-off pyelonephritis, or a low-grade pyelitis, stone in the renal pelvis, or tumor of the kidney. Therefore, when negative, this must be followed by other procedures when lesions of the upper tract are suspected. In a positive sense cystoscopy is usually very important. For example, a tuberculous ulcer will point to tuberculosis of the kidney almost with unerring exactness. A distinctly swollen, edematous, congested, or gaping ureteral orifice will lead to the diagnosis of a lesion of the corresponding kidney, and a diagnosis of a surgical kidney is readily made if a plug is seen coming from one or the other ureteral orifice. Blood seen coming from one orifice will lead us usually to the diagnosis

of renal tumor or stone. While a complete absence of urinary flow from one side, especially if indigocarmin has been previously injected, will diagnose an obstruction usually due to stone or stricture. A ureteral stone engaged in the orifice is likewise readily noted

2. *Ureteral Catheterization* —This is of great value in determining from which side pus or blood originates. By its use one can also detect the presence of a hydronephrosis by watching the urine drop from the distal end, for, instead of the normal rhythmic dripping, a sudden continuous stream is noted. Obstruction of the ureter due to stone or stricture is likewise usually detected with ease. However, one must bear in mind that in a somewhat dilated ureter a stone may offer no obstruction to the passage of the catheter. For bacteriologic examinations ureteral catheterization is absolutely indispensable.

The *x-ray* is likewise of enormous value in confirming our clinical diagnosis as well as revealing conditions which might readily have passed unnoticed. It will show about 98 per cent of all renal calculi, or practically all except the rare uric acid type. When the urine is alkaline in reaction, the absence of shadow on the roentgen plate excludes a calculus of any composition, for in the presence of an alkaline reaction it is certain that phosphates will have deposited upon a uric acid calculus, making it opaque to the x-ray. Often renal stones are latent, for only in 50 per cent of cases does the typical renal colic occur, while pain without colic is present in 30 per cent. of cases, leaving about 20 per cent. without pain which is at all suggestive. I have remarked above that the pain may be referred to the opposite side, therefore making it essential to examine the entire upper tract on both sides; 90 per cent of ureteral stones show in the roentgen plate, the numerous extra-ureteral shadows frequently seen being due to phleboliths, calcified lymph-glands, and concretions in the intestinal tract. The differential diagnosis of these I shall presently take up under the discussion of uretography and the use of the shadowgraph and metal ureteral catheter. The x-ray is particularly of value when repeatedly used to observe the descent of the stone in the ureter at inter-

vals of two or three days. A dystopic kidney in a clear plate is often diagnosed by this method of examination, while various other anomalies are not infrequently detected, as, for example, horseshoe kidney, and, as one of my lantern slides shows, both kidneys present on the right side. Enlargement of the normal kidney shadow may help in diagnosticating renal tumor or tuberculosis, particularly if calcified areas in the latter show up plainly. The diagnosis of hydronephrosis and pyelonephrosis is likewise facilitated by abnormalities seen in the x-ray plate.

I shall discuss together, for brevity's sake, pyelography, uretography, the use of mandrin in the catheter, and of metal catheters. The procedures, when carried out carefully and with the skill which is not acquired with too great difficulty, are perfectly safe and capable of bringing to us a great deal of valuable information. The chief value of filling the renal pelvis and ureter is to determine whether the respective structures are normal in shape, position, size, and number, and whether or not a suspected shadow lies within the lumen of the ureter or within the cavity of the pelvis. A satisfactory pyelogram will definitely show that certain shadows cannot be renal or ureteral stones because they lie at too great a distance from these parts. They will also show distortion of the pelvic outline due either to inflammatory processes, stone, or tuberculosis, showing a jagged, irregular contour; or the smooth and rounded outline of dilations due to back-pressure from obstruction below. Gall-stones may closely simulate renal stones in symptomatology. The shadows may appear absolutely similar in the x-ray plate; pyelography, however, will enable us to show that the shadows cast by gall-stones lie at a considerable distance from the pelvis of the kidney. Ordahl's technic for intensifying the shadow cast by a stone, either in the pelvis or ureter, is a helpful one. The intensification of the shadow depends upon the deposit of a silver solution, usually 20 per cent. collargol, upon the surface of the stone, thus making it denser to the passage of the x-ray.

When a hydronephrotic or pyelonephrotic pelvis is filled with collargol the x-ray plate should demonstrate besides irregularities in size and the presence of dislocation—usually either

laterally or caudally—the origin of the condition; *i. e.*, whether due to malformation of the ureteral mucosa, to bends or twists, to partial obliteration or constriction of the ureter, or to abnormal insertions of the ureter into pelvis. Stereoscopic plates still further enhance the value of radiograms in general, whether made with or without the use of the various substances or instruments introduced. The shadowgraph catheter when placed into the ureter will likewise determine for us whether or not the suspected shadow lies within or without the ureteral lumen; however, in certain instances, for example, in dilated ureters with stone, it does not seem to be as useful as uretography A mandrin introduced into a ureteral catheter has no advantage, in my opinion, over the excellent shadowgraph catheters which are now obtainable. The use of a metal ureteral catheter is particularly indicated when facilities for roentgen examination are not available When used with resonator attachment one can detect a metallic click when the proximal tip comes in contact with the stone in the ureteral lumen To summarize:

1. We have at our disposal various methods of exact diagnosis of lesions of the upper urinary tract.

2. The fields of their usefulness overlap, and each procedure may be made to supplement the other.

3. The use of these mechanical aids does not and should not do away with careful clinical and laboratory methods.

4. Urinalysis and x-ray examination at least should be made routine procedures when even the slightest suspicion points toward urinary tract lesions Often wholly unexpected facts are revealed.

5. The necessity for the use of these procedures lies in the fact that many serious lesions of the upper urinary tract may pass under the mask of various other disease processes and occasion symptoms referable to remote or widely differentiated structures, and, in fact, may for long periods of time remain latent.

CLINIC OF DR. GUSTAV KOLISCHER AND DR. J. S. EISENSTAEDT

Michael Reese Hospital

A NEW METHOD OF ANESTHESIA IN PROSTATECTOMY

Summary: Requisite characteristics of local anesthesia for prostatectomy; topographic relations and nerve-supply of the prostate; flooding the periprostatic plexus—mode of entering the bladder; testing the degree of anesthesia; further injection of anesthetic, if necessary, by the transvesical route.

It requires no argument to establish the desirability of local anesthesia in prostatectomy. The anesthesia, however, must be of such a character as to ensure absolute local insensibility, freedom from physical and mental shock, and an orderly progress of the operative procedure.

From clinical observations and anatomic studies we became convinced that failures in local anesthesia for prostatectomy were due to a misapprehension of the necessary localization and extent of the infiltration used. Moreover, after frequent use of the technic about to be described, we feel justified in asserting that we have developed a procedure which ensures success in the above enumerated points. Our first efforts were directed to a study of the nerve supply of the prostate gland and contiguous structures, especially of the topographic relations. Anatomic studies were carried out in the anatomic laboratory of the Northwestern University Medical School by the courtesy of Professor Ransom.

The sensory nerves of the prostate gland are derived from the prostatic plexus, often a prolongation of the vesical plexus, which lies chiefly on the sides of the gland, between it and the levator ani muscle. Each of the parts, right and left, supplies the prostate and prostatic urethra and sends offsets to the neck

of the bladder and to the seminal vesicles. This plexus is made up of nerves of considerable size, which are derived chiefly from the sympathetic system through the pelvic or inferior hypogastric
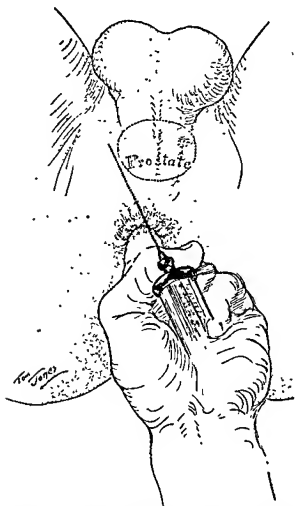
Fig 296 —Insertion of the needle through perineum under control of finger in rectum.

plexus, and from branches of the sacral ganglia and visceral branches by way of the pelvic splanchnics from the second and third or third and fourth sacral spinal nerves. The vesical

plexus presents on either side of the bladder, on a plane with the intramural portion of the ureter, a flat ganglion, from which emanate several ramifications which perforate the bladder wall,
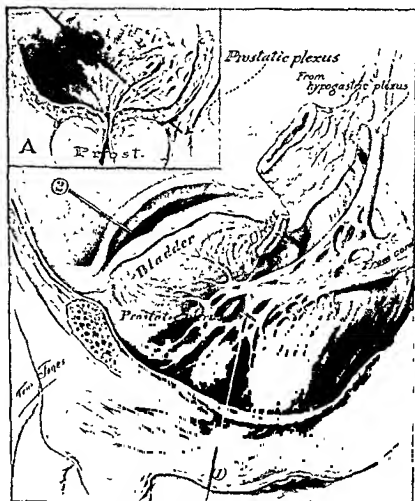
Fig 297 —Illustrating the topographic relations of the prostate, ureter, bladder, and nerve plexus with needles in position   Needle No 1 is the needle shown in Fig 298, as entering the perineum   Needle No 2 is the needle as shown in insert A, and is employed when the infiltration from perineum has been insufficient or incomplete.   Note that this needle pierces bladder wall at a point along a line drawn between ureteral and urethral orifices

surround the vesical end of the ureter, the prostate, and seminal vesicles, and form around each of these organs a secondary plexus, in the center of which are several ganglia, some of the branches of which may be traced across the prostate, the

close to the incision have also to be desensitized in order to pre-
vent the perception of pain excited by the insertion of retractors
The same procedure has to be carried out in infiltrating the sub-
cutaneous and subfascial tissues   After the anterior aspect of
the bladder with the adherent peritoneal reduplication has been
exposed, the infiltration must follow the line of the peritoneal
attachment to the bladder wall (Fig 299)   Only in this way will
the stripping off of the peritoneal fold be made painless   Now
the bladder is opened, and the success of the perineal flooding
of the periprostatic plexus is tested by exerting traction on the
prostatic tumor by means of a volsellum or a tumor screw   If
this perineal flooding has accomplished its purpose, then the
pulling on the prostate or the stretching of the posterior urethra
will cause no pain whatever   It may also be mentioned that
this complete anesthesia is accompanied by blanching of the
mucosa covering the prostate.

In case the aforementioned manipulation should cause any
pain, the proof is furnished that the periprostatic plexus has not
been reached, and, therefore, the anesthesia must be completed
by flooding these nerve centers from within the bladder
This is carried out in the following way   The needle perforates
the bladder wall from within at a point located on a line drawn
from the ureteral opening on either side to the internal urethral
orifice   The direction of the needle is forward, outward, and
somewhat downward, to ensure again the blocking of the pros-
tatic nerve plexus (Fig 297)   The quantity of anesthetizing
fluid used is the same as used in the perineal injection

CLINIC OF DR. HERMAN L. KRETSCHMER

PRESBYTERIAN HOSPITAL

(WITH PRESENTATION OF TWO CASES FROM ALEXIAN BROTHERS HOSPITAL)

BENIGN HYPERTROPHY OF THE PROSTATE AND ITS TREATMENT BY SUPRAPUBIC PROSTATECTOMY

Summary: The history, examination, diagnosis, operative pathology, and post-operative course of four patients, advantages of a comprehensive pre-operative study of patients with hypertrophy of the prostate—the points requiring special care; pre-operative management, choice of methods of treatment for patients with (*a*) residual urine; (*b*) complete retention; (*c*) cystitis; post-operative hemorrhage, benign hypertrophy; chronic prostatitis; carcinoma— the diagnosis and prognosis.

CASE I.—This patient that I am going to show you first is a man aged sixty-nine, who was admitted to the hospital ten days ago with the following history·

Six years ago he first had difficulty in passing urine, which difficulty was associated with pain located in the penis during urination. At times he experienced great difficulty in passing his urine, frequently going for several hours without being able to void, and when he did void he was able to pass only a few drops. This urinary obstruction was variable, being worse some days than others. Three years ago the patient experienced severe pains in the urethra, and passed a little blood from the urethra two or three times in the morning, after which the urine appeared normal in color. One year later he again passed a little blood from the urethra. The frequency and difficulty of urination have been present with slight variations, as pre-viously mentioned, ever since the onset of his trouble. For the past five years he has been obliged to arise four or five times at night.

Four days before entering the hospital the patient had a severe attack of hematuria associated with pain in the penis. This gradually became worse, and while at work he passed dark bloody urine and many large clots. The distress increased rather rapidly, and he then had a considerable degree of suprapubic pain and a more or less constant desire to urinate

Examination shows a small, poorly developed man, weighing 120 pounds. Head and neck are negative. Examination of the chest reveals the presence of many râles, anteriorly and posteriorly, and a slight mitral systolic murmur is heard over the apex.

Examination of the Abdomen —A round prominent swelling is present in the lower part of the abdomen extending from the symphysis pubis to the umbilicus. This swelling is very sensitive, and on percussion is flat. In the right inguinal region there is a swelling the size of a hen's egg. It is not tender. This, he says, has been present for five years. The external genitalia are negative.

Rectal Examination.—The prostate is only moderately enlarged. The surface is smooth. No areas of tenderness. Rectal examination was not painful. The seminal vesicles are negative.

Examination of the urine shows the presence of blood and pus; no sugar; a trace of albumin.

From the findings and the history a diagnosis of enlargement of the prostate with retention of urine and an intravesical hemorrhage was made. A metal catheter was passed into the bladder for the purpose of relieving the retention and irrigating his bladder, after which a cystoscopic examination would be in order. The catheter entered the bladder easily, but *no urine* flowed from it. After much manipulation a small clot was removed, so that it was evident that this patient was having, at the time of his admission to the hospital, an extensive hemorrhage into his bladder, and because of the impossibility of removing the clots and distending the bladder a cystoscopic examination was out of the question. The condition was explained to the patient, and he was advised that a suprapubic

cystotomy under local anesthesia was the best way out of this situation.

Accordingly, under local anesthesia the patient's bladder was opened suprapubically. The entire bladder was filled with large masses of blood-clots. After removing the clots and irrigating the bladder, large retractors were introduced into the bladder for the purpose of inspection. Examination of the interior of the bladder showed the presence of a moderate degree of enlargement of the lateral lobes and a very prominent middle lobe that projected into the bladder much like a small uterus. Running down the posterior aspect of this middle lobe was seen a large tortuous vein that had ruptured and from which the bleeding had taken place. Rupture of varicose vessels in the bladder is extremely rare. This is the second time that I have seen a patient who had ruptured varicose veins, and in both instances the condition was associated with an enlarged prostate. The bladder was packed tight with iodoform gauze and the patient placed back in bed.

This is one of the rare instances in which cystoscopy preliminary to prostatectomy was not carried out, and in which we were unable to carry out a phenolsulphonephthalein test for renal function.

One week after the preliminary cystotomy a suprapubic prostatectomy was performed under sacral anesthesia, the anesthetic having been administered for me by Dr. Malcolm L. Harris. The time of operation was seven minutes. Two lateral lobes and a large median lobe were removed. The dissection was clean and there was only a small amount of hemorrhage. Two gauze packs were inserted into the cavity from which the prostate was removed. Half the gauze packing I removed the first twenty-four hours after the operation. The remainder of the packing I removed at the end of forty-eight hours. In ten days the patient voided through the urethra and the wound closed in fourteen days. He was discharged in eighteen days from the time of his prostatectomy.

The case is interesting because of its being in the nature of an emergency, and in view of the fact that we were not able to

do a cystoscopy and carry out our usual kidney function tests before operating. The thalein test, carried out after the cystotomy and before the prostatectomy, showed an output of 58 per cent.

CASE II.—The second patient that we have is Mr. E., aged sixty-five, who gives the following history:

For the past four years the patient states that he has noticed a gradually increasing difficulty in passing urine. He has had frequency both day and night, being obliged to rise three or four times at night. Two or three months ago the symptoms became very much worse, so that he was obliged to rise four or five times at night and had considerable difficulty in starting the stream, so that he was obliged to strain a good deal, which caused him considerable pain. At this time he consulted a physician, who performed a double vasotomy for the relief of the urinary trouble. This operation has not given him any relief. Two weeks before entering the hospital the pain on urination became excruciating and he could void only small drops of urine at a time. His urine at this time, he states, was very turbid. He consulted a physician, who told him he had cystitis. There has been no hemorrhage from the urinary tract. The patient has lost a good deal of weight.

Examination.—Elderly white male, poorly developed, aged sixty-five. Head is negative Many teeth are missing, and those remaining are in very bad condition. Neck is negative. Chest shows a few moist râles in the base of both lungs posteriorly. Examination of the heart shows it to be irregular and the apex-beat very feeble. He was referred to the medical side and examined by Dr. H. Klein, who reports the following:

"Beginning dilatation of the left ventricle and a reduplication of the first sound Considerable arteriosclerosis. Diagnosis of myodegeneratio cordis Four subsequent blood-pressure examinations revealed the blood-pressure to vary from 128 to 132 Advised against the use of a general anesthetic should we decide to operate upon him."

The abdomen is negative. He has a left indirect inguinal hernia of seven years' standing. The external genitalia are

negative. The scrotum shows the scars of his previous vasotomy operation. The prostate is not distinctly enlarged. It is round, prominent, and firm in consistency. Two very small lateral lobes can be felt.

Cystoscopic Examination — A generalized cystitis with a good deal of trabeculation. In the apex of the bladder is seen a large diverticulum   A well-defined prostatic notch was seen above   At the base of the bladder was seen the presence of a large median lobe. Examination for residual urine revealed the presence of 130 c.c. Cultures of the residual show the presence of staphylococci and Bacillus coli. The phenolsulphonephthalein test, intravenous injection, showed the time of appearance to be six minutes. Elimination during the first half-hour was 50 per cent., and during the second half-hour was 10 per cent   Total elimination one hour, 60 per cent. Blood-pressure, systolic 140 and diastolic 90

Because of the patient's bad general condition it was decided to do a two-stage prostatectomy. Accordingly, one week ago the bladder was opened under local anesthesia, using novocain, and a large drainage-tube inserted. Since then the patient has reacted very nicely. He is now ready to have his prostatectomy, which we will perform under sacral anesthesia because of his impaired heart and lung condition

The sacral anesthesia was administered for me by Dr M. L. Harris. Our usual suprapubic operation will be carried out. The finger is inserted through the suprapubic wound and the actual enucleation proceeds rapidly without much difficulty. The prostate is now freed and removed with forceps. The cavity from which the prostate has been removed will be packed with iodoform gauze

Examination of the specimen shows the presence of two minute lateral lobes, each one not larger than a very small hazelnut, but here you see the presence of a well-defined large pedunculated middle lobe, so that every time the patient attempted to urinate this large lobe would fall over the internal urethral orifice and close his bladder neck (Fig. 300).

Removal of the prostate required four minutes. Sections

*stripped back off the bladder with a gauze sponge and the
bladder comes into view. The bladder is picked up with two
silk sutures and an incision 3 inches long made in the bladder
high up. After removing the fluid, large retractors are put into
the bladder for the purpose of inspection   At the internal
urethral orifice is seen a well-pedunculated middle lobe   No
lateral lobes are seen. A suprapubic prostatectomy will be*
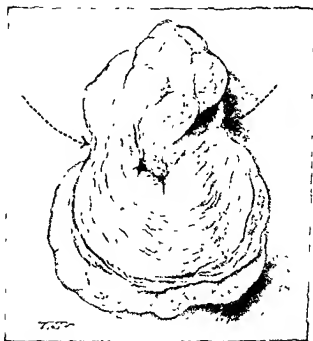
Fig 301 —Case 3 Prostate after removal Note constriction produced by the
                        internal sphincter

*performed, removing both lateral lobes and the pedunculated
median lobe Although the lateral lobes cannot be seen project-
ing into the internal ureteral orifice, it seems to me that a
radical removal of the entire gland should be carried out to pre-
vent any other obstruction taking place later*

*The prostate is enucleated in four minutes from the time we
made the skin incision A hot laparotomy pad is placed in the
cavity, which controls all the bleeding The bladder is sutured*

with catgut; the sutures do not include the mucous membrane. A small rubber drainage-tube is fastened into the bladder with a catgut stitch, the sheath of the rectus is closed with catgut, and a small strip of iodoform gauze is placed into the space of Retzius. The closure of the skin is with silkworm-gut and silk.

Examination of the specimen shows the presence of two small lateral lobes. Each one is as large as a hazelnut without the hard shell. The median lobe is as big as a whole hazelnut. It is fairly well pedunculated, and because of this well-defined pedicle it is easy to see why with the cystoscope we obtained the impression that this was a prostatic bar and not a median lobe, because, when the cystoscope was introduced into the bladder and pushed down across the middle lobe, moving it down toward the base of the bladder, one had the impression that this was a median bar and not a median lobe, so that after all it seems to me that we were justified in doing a radical prostatectomy and not a punch operation (Fig. 301).

CASE IV.—E. H., aged fifty-seven. Duration of trouble three years, beginning with obstruction to frequency of urination. The patient states that as far back as twenty-five years ago he first noticed that the stream lacked force, that the urination was prolonged, and that a slight obstruction seemed to be present. Three years ago the obstruction became worse, the stream became smaller, and lacked force. Since then his trouble has been getting steadily worse, until now he often has great difficulty in urinating because of the obstruction. Two years ago he would have to get up occasionally at night to urinate, and this has been present ever since. Two weeks ago the frequency of urination suddenly became a very prominent and most distressing symptom, the patient being obliged to urinate every hour during the night and day and being able to void only from 1 to 2 ounces. In January the patient had a similar attack of frequency, though much less in severity. For six weeks the patient has had severe pain in the shaft of the penis during and following urination. The patient also complains of constant pain in the rectum, which is more marked at

some times than at others, and which is always aggravated after urinating.

Four weeks ago, while straining at urination, he was suddenly seized with a severe pain in the abdomen. He had a slight spasm of the abdominal muscles, and during this he felt some-*thing give way in the lower right quadrant of the abdomen,* where a mass developed which, upon examination, is now re-vealed as an inguinal hernia.

Four years ago he discovered the presence of sugar in his urine. Sugar has been present ever since. At one time he was told that his urine contained 3 per cent. sugar. Since then he has been on a diet more or less, and when he adheres strictly to the diet his sugar disappears.

Physical Examination.—The patient is a well-developed, well-nourished white male Head and neck are negative. Heart, lungs, and abdomen negative. Cystoscopic examination shows a generalized cystitis and a very marked trabeculation of the bladder and two very large prostatic lobes, forming a distinct notch above. No stones or tumors seen. On rectal examination, two enormously enlarged prostatic lobes are felt The surface is smooth and not tender. Seminal vesicles are negative.

Examination by Dr. Woodyatt.—Blood-pressure, 164 systolic and 104 diastolic. Pupillary and all other reflexes O. K. There is a slight nasal catarrh. Tonsils are submerged Heart· Left border at mammary line, fourth interspace, 13 cm. to the left of the midsternum The right border in the fifth interspace and 15 cm. to the right of the midsternal line.

Blood Examination —Leukocytes, 6300; hemoglobin, 88 per cent.

Examination of the blood shows the following: Sugar, 1 83 mg per 10 c.c ; urea nitrogen, 27 4; creatinin, 1 6.

The phenolsulphonephthalein test: First half-hour, 32 per cent.; second half-hour, 15 per cent.; total, 47 per cent Time of appearance, six minutes.

Roentgen-ray examination for stone in the urinary tract negative.

Owing to the fact that the patient had severe distress and

severe pain and great frequency, and because of the fact that catheterization had to be carried out regularly, a preliminary suprapubic cystostomy was made. It seemed to me a good plan to relieve his bladder distress, during which time his diabetic condition could be managed. The first specimen of urine upon admission showed the presence of sugar. Since then, upon management, his urine has been sugar free. Suprapubic cystostomy *was done ten days ago, and this morning we will remove the* prostate. The right index-finger is introduced into the suprapubic opening and the left index-finger into the rectum. The prostate is enucleated in six minutes. There is a rather large amount of bleeding, which will be thoroughly controlled by packing iodoform gauze into the cavity from which the prostate was removed. The wound is closed in the usual manner with silkworm-gut sutures.

During the past ten years there has been a steady and progressive diminution in the mortality rate of prostatectomy. This has been obtained in part by a careful and thorough preoperative study of each case, as well as by refinements in anesthesia and operative technic. We believe that a comprehensive preoperative study in the case of a patient with hypertrophy of the prostate should include the following:

(1) An accurate diagnosis of the local condition at the vesical orifice and the determination of the presence or absence of other lesions in the bladder, such as tumors, calculi, diverticula, etc.

(2) A careful study of the renal function.

(3) A rather careful, comprehensive differential diagnosis.

As I think of the many things accomplished by a preoperative study, the one that stands out prominently is the fact that it has led to a better preparation of the patient. Furthermore, it is well known that the mortality rate in cases operated upon within a day or two after admission to the hospital is very high and that this mortality is usually due to uremia.

Another distinct advantage of thorough preoperative study is that it admits of a rapid prostatectomy. I am a great believer in rapid operating in these old men. It does not seem

reasonable to me that one shall fool away as much time as he wishes in operating upon men of advanced years who have bad hearts, bad arteries, etc. The average time consumed in removing a prostate should not be more than seven or eight minutes from the time of beginning the skin incision until the prostate has been enucleated. By rapid prostatectomy is not meant rough or careless operating. There can be no question that the less anesthetic these patients are subjected to the better. Statistics show that pulmonary complications still cause about 10 per cent. of the fatal terminations, and it seems reasonable, therefore, that a patient in whom the entire operation consumes from five to seven minutes is less liable to pulmonary complications than is one in whom the prostatectomy consumes an hour or more. For this reason we believe that sacral anesthesia has a definite field of usefulness, as is the case with gas-oxygen anesthesia in certain cases. As a routine we do not have one anesthetic, but we rather select the anesthetic that we believe is the best suited to the individual patient. The three anesthetics that we use are ether, gas-oxygen, and sacral, the sacral being preferred to the so-called spinal anesthesia.

The value of cystoscopy in this group of cases cannot be questioned. Of the various diagnostic measures that are at our command, it is the one giving us the most information and sometimes information that cannot be obtained in any other way, as in the first case operated upon this morning, where the patient obviously had the symptoms of a prostatic obstruction and residual urine, yet rectal examination showed a small prostate and one that impressed me as being about normal in size for a man of his age. Cystoscopic examination, however, demonstrated the presence of a well-defined middle lobe, and that this was the cause of his obstruction is proved both cystoscopically and by operation. By means of the cystoscope, therefore, one may ascertain the type of enlargement of the prostate as well as the presence or absence of a coexisting lesion in the bladder, and, furthermore, one may definitely decide upon the route of approach and the type of operation to perform. In this way much valuable time is saved at the time of operating that would

otherwise be spent in needless exploration. In other words, having cystoscoped this patient this morning, and knowing that there were no other conditions in the bladder, it was a simple matter for us to enlarge his suprapubic wound, making it just large enough to admit the index-finger, by means of which the prostate was enucleated. In a case in which no preliminary cystoscopy is done it becomes necessary, of course, to make a long bladder incision, to introduce retractors, and to see what complicating condition may or may not be present in the bladder. All these things take time, and it seems that the time of operating should be reduced to a minimum.

Doubtless one of the biggest factors in reducing the mortality rate has been the study of the renal function. Renal insufficiency still heads the list of the causes of death following prostatectomy. It is generally acknowledged that routine employment of the functional tests has aided in reducing the mortality rate. Study of the renal function has also contributed in a measure to the so-called preliminary treatment. These patients being old men very often have many other things the matter with them besides their urinary trouble, so that each patient must necessarily be subjected to a complete physical examination, which should include a careful study of the blood, urine, blood-pressure, roentgen-ray examination, and a thorough examination of the heart and lungs. Doubtless in some of these obscure cardiac cases much valuable information may be obtained by the use of the electrocardiograph.

The preoperative management, in the main, consists of local treatment which has for its object:

(1) The improvement of renal function.
(2) The relief of back-pressure on the kidneys.
(3) The elimination of the infection from the bladder.

By improving renal function as much as one can, we prevent or reduce to a minimum the postoperative complications due to renal insufficiency. We instruct our patients to drink water regularly and to drink definite amounts. At times it may be desirable to administer as much as 4 or 5 liters in twenty-four hours. This, however, must not be a hard-and-fast rule, but

must be an elastic one. For example, in some of our cases the patients were suffering from a severe organic disease of the heart with associated evidence of broken compensation. Obviously to tax an already overburdened heart would not be the most desirable method of procedure, but in a case in which the heart will permit we believe that the use of large quantities of water, given in definite amounts and at definite times, is a very desirable procedure.

The relief of the back-pressure on the kidneys and the relief of infection may be discussed together. The one fact that stands out prominently in the management of cases of benign hypertrophy of the prostate is this one, that each case is a problem in itself, and demands, therefore, individual management, so that we believe that these cases must be selected and managed as individual cases, and that a hard-and-fast rule cannot be put down to apply to these patients as a group or as a whole. The majority of patients who come to us suffering with benign hypertrophy of the prostate have residual urine, which varies in amount often from several ounces to a pint or more, and not infrequently these patients come to us suffering from complete retention. To the elements of residual and retention must be added a third element, that of infection, which is so often present. The handling of these three elements is the problem of the local management of the bladder.

In managing the bladder one may proceed in one of three ways:

(1) By the regular and systematic use of the catheter.
(2) By the use of the in-dwelling catheter.
(3) By suprapubic drainage.

In a certain number of cases it is often possible to get along very well by the use of the catheter, each catheterization to be followed by an irrigation. Both catheterization and irrigation must be done, of course, under the strictest aseptic conditions Too much stress cannot be laid upon this fact. We are all familiar with patients who use a catheter that they carry in their pocket, and we are also familiar with the many doctors who use catheters without boiling them, and who, therefore,

fail in their instructions to the patients, not giving them the necessary instructions regarding asepsis. At times patients may not tolerate catheterization, so that each attempt to catheterize and irrigate is followed by severe urethral pain and often by chills and fever. Not infrequently patients tire of catheterization, so that they discontinue it. It is perfectly clear, therefore, that catheterization, while it can be carried out generally, in a large number of cases, cannot always be carried out in clinic patients because they will not co-operate.

Second, the permanent or in-dwelling catheter. When this procedure is possible, good, efficient bladder drainage is established. The presence of the catheter, however, may result in the production of more or less urethritis associated with pain, so that after a longer or shorter time it becomes necessary to remove the catheter. Bleeding in considerable amounts may also interfere with the carrying out of this treatment.

Third, suprapubic drainage. This may be carried out either by suprapubic puncture or by an open operation. Suprapubic puncture has one very serious drawback in spite of its apparent simplicity; that is, the danger of injury to the peritoneum with a resulting peritonitis and death. I have seen one such case in which a young man was sent to my clinic who had had two or three attacks of complete retention of urine. His local physicians were unable to catheterize him and performed a suprapubic puncture and sent him to Chicago. I succeeded in passing filiforms and in re-establishing urethral drainage. The next morning after the patient had been admitted to the hospital a peculiar fecal-like odor was noted upon the dressings that had been placed over his suprapubic puncture. The advice was to operate immediately, the diagnosis having been made of injury to the bowel. This patient refused, and he died shortly after. It is a simple procedure to plunge a trocar into a bladder distended as high as the umbilicus. While in theory the peritoneum is entirely away from the anterior aspect of the bladder in this type of case, nevertheless there are cases in which the peritoneum is firmly adherent low down on the anterior wall of the bladder, so that when the bladder rises the

peritoneum is not carried away. It seems to me, therefore, that the more rational and safe procedure is the performance of a suprapubic cystotomy under local anesthesia. For the purpose of drainage one may use either a large catheter or a tube. I prefer a tube. With the establishment of bladder drainage, the process of flushing the kidneys by the administration of a large amount of water can be carried out. Irrigation can be now commenced, irrigating directly through the urethra or through the suprapubic drain.

One is often asked the question, How long should the preliminary treatment be carried out before undertaking the prostatectomy? It is certainly clear that there can be no definite answer to this question. The entire question of prostatic hypertrophy divides itself into an individual problem; that is, each case is a law unto itself and must be managed as such. In some of the cases suprapubic cystotomy was carried out and the prostatectomy was never done, the patients having died from intercurrent disease; for example, cardiac failure. In determining when the second operation should be carried out, one can be guided by some method of estimating the renal function Our experience has been almost entirely limited to the phenolsulphonephthalein test. However, we do not rely absolutely on the figures obtained in carrying out the test. I believe that the test should be a part of the gross clinical evidence. When a low reading is obtained by this test, the patient is put upon the previously mentioned management. At the end of four or five days the test is repeated, and where these tests are repeated again every four or five days it is surprising how a patient who came in with a low total output will rapidly improve under management. Then, if the figures obtained after a careful, systematic preliminary treatment are not up to the normal figures, but if the figures show improvement, and if they remain constant, so that we may assume that the renal function has been improving up to a point beyond which it cannot be improved, we then proceed with a prostatectomy. Nor do we rely entirely upon the use of the dye-test. I believe that certain clinical phenomena may also be used as criteria in conjunction

with the tests. We are all familiar with patients in whom an apparently simple suprapubic cystotomy has been performed under local anesthesia who show signs of renal insufficiency. The insufficiency is usually transitory, yielding to judicious treatment. The tongue again becomes moist, the patient improves, the appetite returns to normal, and the output of urine increases. When this has occurred we believe one may safely remove the prostate.

Removal of the prostate after a preliminary cystotomy should be a matter of but a few minutes; at the very outside five minutes are all that are required, and very often the prostate can be removed in three or four minutes. The performance of a rapid prostatectomy has many advantages. The amount of anesthesia is small, and hence the danger of pulmonary complications is reduced to a minimum. Bronchitis and pneumonia are still among the factors responsible for a large number of the prostatectomy deaths. The gastric disturbances accompanying this short anesthesia are practically nil, so that the fluid intake and nutrition so important in these cases are not interrupted. When sacral anesthesia is used or gas this factor is completely removed. In the two-stage cases, therefore, there is practically no interruption in the convalescence from their suprapubic cystotomy. Patients who have had preliminary bladder drainage, requiring as they do but three or four minutes of anesthesia, are not so apt to develop pulmonary complications as are patients who have had an anesthetic lasting an hour or more. As I said before, this is one of the advantages of the previously mentioned preliminary observation, which should include a careful cystoscopic study of each case, thereby permitting of rapid removal of the enlarged gland.

The selection of any particular type of operation or route of approach will depend in part upon the local pathologic conditions present and in part upon the operator's familiarity with one type of operation or another. Doubtless those who have had more experience with the suprapubic operation can obtain better results than they could with the perineal, and the reverse is true

with a man whose widest experience has been with the *perineal* operation.

There is one thing that I do like to talk on, and that is the question of management of hemorrhage in these cases. I am a firm believer that one should control the hemorrhage completely and absolutely. It is a well-known fact that many of these patients have rather sharp hemorrhages. I believe in packing the cavity from which the prostate has been removed, and as a routine in my two-stage operations I pack the cavity with large strands of iodoform gauze if there is any doubt in my mind that they are going to bleed. In some of the cases, particularly where one makes a clean enucleation, there is not much bleeding. In these cases a large drainage-tube is sewed into the bladder, which is removed at the end of twenty-four or forty-eight hours. So, whenever there is the least suspicion in my mind that the patient may bleed, or that the bleeding at the time of operation is not controlled by pressure when a gauze pad is introduced into the wound, we pack, and we pack with enough gauze to completely control the hemorrhage. Other methods besides packing are in vogue, such as the use of the Hagner bag and the transplantation of fat, but I think that gauze packing is better adapted to the usual run of cases.

Before concluding it might be well to call attention to the fact that there is still room for improvement in the diagnosis of benign hypertrophy. A great deal of confusion still exists in the minds of many men as to just what constitutes hypertrophy This I think is due to the rather loose use of the word. For instance, we are told that a patient of twenty-two or twenty-three is suffering from hypertrophy of the prostate. These cases are nearly always cases of chronic prostatitis, so it is necessary to differentiate between benign hypertrophy and chronic prostatitis This may be a little more difficult when the patients are nearing the prostatic age. After having definitely determined the fact that we are dealing with an enlargement of the prostate, our next question for consideration is whether or not it is carcinoma This is not always easy to do. Carcinoma was formerly looked upon as a rare lesion of the prostate. Carcinoma is found more

often and is more frequent in its occurrence than was formerly supposed. Because of its point of origin and because of the late development of symptoms much valuable time is lost, or most of the cases are seen too late to have good radical treatment carried out. The diagnosis is comparatively easy in cases in which not only the prostate but the seminal vesicles and even the perirectal structures are involved by the cancer. The adenomatous prostate is usually soft, whereas the cancerous prostate is hard and indurated. Cystoscopic examination is often of value in making the diagnosis in cancer, because there is an absence of the intravesical protrusion seen in benign hypertrophy, and in the late cases one may see the carcinoma growing from the prostate into the bladder. Rectal examination with an instrument in the urethra may reveal the presence of the infiltration. Obscure pelvic pain in old men is of sufficient importance to warrant an examination of the prostate. It must not be forgotten that cancer of the prostate has a predilection to produce bone metastases. Spontaneous fractures and obscure intercostal neuralgia in men with symptoms of bladder trouble should always suggest the possibility of cancer of the prostate. No differential diagnosis is complete without excluding disease of the central nervous system. We are familiar with patients who have tabes and other lesions of the central nervous system, and are operated upon or sent to us for operations for benign hypertrophy of the prostate, when their bladder symptoms are part and parcel of lesions of the central nervous system.
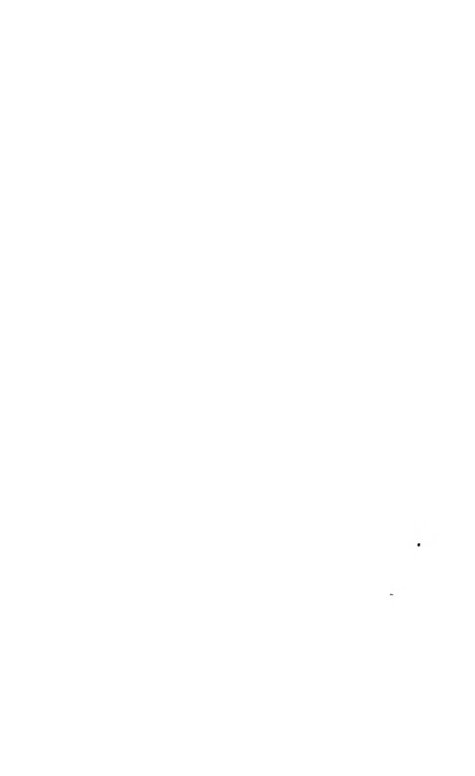
CLINIC OF DR. GEORGE E. SHAMBAUGH

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I. CARCINOMA OF THE MAXILLARY SINUS

Summary: Transillumination in suspected sinus trouble; comparative value of the skiagraph; puncture of the nasal wall of maxillary sinus—location of choice—precautions to be observed; tardy diagnosis of carcinoma in present case.

II. CHRONIC EMPYEMA OF THE NASAL ACCESSORY SINUSES

Summary: The diagnosis of chronic sinus infection and the identification of the seat of the disease; acute inflammation in nasal chambers the usual source of sinus infection; treatment, drainage essential; advantages of intranasal operations, end-results.

III. SUPPURATIVE OTITIS MEDIA WITH PARALYSIS OF THE EXTERNAL RECTUS

Summary: Examination of case and the operative procedures undertaken; control of hemorrhage from the internal carotid; paralysis of the external rectus a complication of mastoiditis, its course and duration

IV. CHRONIC INFECTION OF THE SUBMAXILLARY GLAND

Summary: A patient with recurrent attacks of painful enlargement of the submaxillary gland and its duct; chronic tonsillitis—its probable etiologic relation to the submaxillary adenitis.

V. CHRONIC EMPYEMA OF THE MAXILLARY SINUS

Summary: The diagnosis and treatment; satisfactory drainage obtained through middle meatus.

VI. LUDWIG'S ANGINA

Summary: Signs, symptoms, and treatment in present case.

CASE I. CARCINOMA OF THE MAXILLARY SINUS

The case is that of a man aged sixty who consulted me last July. His sole complaint was of a sensation of pressure on the

right side of the face. This, he claimed, had annoyed him only a few weeks and had first appeared during an acute head cold. He did not complain of any increased nasal discharge. He recalled an attack of maxillary sinus infection from which he had suffered forty years before. Since that time he had not been troubled with any nasal symptoms nor any annoyance in the region of the right maxillary sinus until the development of the present trouble.

Examination disclosed no external evidence of trouble in the region of the right maxillary sinus. The nasal passages were quite clear and entirely free from any of those alterations usually associated with a chronic accessory sinus empyema. The region of the middle meatus was carefully inspected by lifting up the free edges of the concha media, but nothing was detected which suggested a possible sinus infection The upper molar teeth on the right side were quite bad, and presented conditions frequently found when they have been the cause of chronic maxillary sinuitis. Transillumination found the frontal sinuses quite clear on both sides The left maxillary sinus was also clear, but a deep shadow was discovered over the right side. This was the only evidence found indicating that the symptoms complained of had their possible origin in the maxillary sinus. One not infrequently sees cases where sensations of discomfort or even pain are complained of over the region of the maxillary sinus where no trouble whatever is found in the sinus itself. The transillumination test is of great value in examining cases suspected of either frontal or maxillary sinus trouble. In the majority of cases where the sinuses are free the fact can be established by the use of this test alone. In cases where, by this test, the sinuses are found quite clear, it is not necessary to make further examinations. There are, however, not a few cases where one will be left in doubt after the use of the trans-illumination test. These are the cases where the sinuses are found to be not clear. In such cases a more complete examination of the sinus is called for. It is here that the skiagraph will frequently be found to be of greater value than the transillumination test. This applies to the frontal more than to the maxillary

sinuses for the reason that a shadow over the frontal sinus is often caused by the presence of a very small sinus. With the skiagraph not only the size of the sinus can be shown, but a very good idea can be obtained from the plate as regards the contents of the sinus. When it is the seat of acute or chronic empyema, this is shown, as a rule, very clearly in the skiagraph. As regards the maxillary sinus, the skiagraph is of less value. In the first place, extreme variations in the size of this sinus are exceedingly rare as compared with the frontal sinus, and, in the second place, it is a comparatively simple matter to examine the contents of the maxillary sinus by simple irrigation.

On the strength of the shadow over the maxillary sinus discovered by transillumination it was decided to puncture the nasal wall and irrigate the sinus. There are two places where this puncture can be made. One is well up under the inferior turbinated body, ½ to ¾ inch from the anterior end of this structure. A straight needle is used, and care must be taken that the force used to push the point through the bony wall does not also drive the needle across the usully small space separating this point from the orbit. The other location for introducing the needle is in the middle meatus, a little posterior to the middle of this space. This is usually the location of choice for the reason that in this region is located the so-called nasal fontanels, spaces where the bony partition wall separating the nasal cavity from the sinus is lacking, and it is only necessary to force the needle through a delicate membranous partition. A straight needle cannot be used for the reason that it would pass directly into the orbit instead of the sinus. Specially curved canulas are required. The best one is the Killian maxillary sinus canula. Care must be taken to place the point of this instrument not too far above the upper border of the lower turbinated body, and to direct the point as much downward as outward in order to avoid entering the orbit. Often the point enters the sinus with very little force or even passes directly through the normal or an accessory opening of this sinus. Irrigation should always be started very cautiously, and if the patient complains of pain in the eye, the needle should at once be

withdrawn. It is not possible to be sure that the point of the needle may not have entered the orbit.

In the case of this patient the puncture was made in the middle meatus, and on irrigation clumps of thick mucopurulent secretion were washed out. The character of the secretion washed from the sinus was not like that found in cases of chronic empyema, but was rather the type of secretion that is usually found in the maxillary sinus after the subsidence of an acute sinus reaction which is not infrequently associated with acute head cold. Enough evidence of sinus trouble was found to account for the shadow on transillumination, but this would hardly explain the persistence of the symptoms of pressure of which the patient complained. Directions were left to have the sinus irrigated at intervals of three or four days until the secretions disappeared. At the same time the patient was referred to Dr. Moorehead to have the decayed upper molars removed. Arrangements were made for a Wassermann test. Nothing was found to indicate a malignant growth in the sinus

It is now two months since I first saw this patient. He comes today complaining of increasing pain over the right side of the face. The Wassermann test has been found negative and the decayed upper molar teeth have been extracted I am struck at once by the change in the patient's appearance. He has evidently lost in weight and shows distinct cachexia. He complains especially of the pain which still persists in the gums from which the teeth have been extracted. Examination shows the right eyeball somewhat protruding and fixed, and the patient is blind in this eye. No evidence of any trouble is found intranasally, but from the unhealed tooth-sockets exuberant newly formed tissue protrudes Portions of this growth have been examined microscopically, and we now know it to be carcinoma

Subsequent History.—The patient was referred to Dr. Bevan, who operated and removed the superior maxilla. The patient did not recover from the operation, but died about one week later.

CASE II. CHRONIC EMPYEMA OF THE NASAL ACCESSORY SINUSES

The case is that of a woman, aged thirty-nine, who consulted me last September. She complained of a purulent discharge from the left side of the nose which had annoyed her for something over two years. For the past six months she had suffered more or less from pains centering about the inner canthus of the left eye. During this period she had also suffered a great deal from headaches. She stated that during the previous winter the left maxillary sinus had been punctured and irrigated every few days for a couple of months, but without improvement.

The examination disclosed a profuse discharge of creamy pus oozing out from among a mass of small mucous polypi which filled the middle meatus of the nose on the left side. The right side of the nose appeared quite normal. Transillumination disclosed perfectly clear frontal and maxillary sinuses on the right side, while both of these sinuses on the left side appeared quite dark. The left maxillary sinus was irrigated by introducing a canula through the middle meatus and a quantity of foul-smelling pus was washed out. Twenty minutes after this irrigation creamy pus began again to ooze from the middle meatus. It was evident that this could not be coming from the maxillary sinus, and its presence indicated a combined empyema, which, from the shadow over the frontal sinus, indicated an involvement of this sinus. The presence of the mucous polypi cropping out of the middle meatus from the floor of the ethmoid labyrinth pointed, in addition, to an involvement of the anterior ethmoid cells. Since the space between the middle turbinated body and the septum was quite free from either polypi or pus it seemed doubtful that the sphenoid sinus or posterior cells were involved.

There was no evidence of trouble with the upper molar teeth on the affected side, and it seemed clear, therefore, that the infection in the sinuses had originated in the nasal chamber. Most cases of accessory sinus infection, either acute or chronic, have their origin from acute inflammation in the nasal chambers. It is rather the exceptional case where the infection starts from

an abscess about the roots of the upper molar teeth. An infection which starts from an alveolar abscess involves, of course, primarily the maxillary sinus, but the process is not necessarily confined to this sinus. Quite frequently both the frontal sinus as well as those ethmoid cells which drain into the middle meatus are also involved. Occasionally, one sees a pan-sinuitis involving all the accessory cavities on one side; that is, the sphenoidal sinus and the posterior ethmoid cells as well as those sinuses which drain into the middle meatus, namely, the frontal and maxillary sinuses, together with the anterior ethmoid cells, all having its origin from the rupture of a tooth abscess into the maxillary sinus. I have seen the infection in such cases involving all the sinuses on both sides of the head. The passage of the infection to the opposite side may take place through a rupture of the septum dividing the two frontal sinuses.

The problem of how best to handle these chronic cases is not always an easy one. Where there is a dental origin for the trouble, the first thing to do is to see that the offending tooth is extracted. This alone is seldom sufficient to cure even a chronic empyema restricted to the maxillary sinus. To cure these cases it is necessary to secure, first of all, better drainage. In order to secure this there are several types of operation that may be undertaken. In the case of the maxillary sinus, the most radical procedure consists in the removal of the anterior wall of the sinus and the making of a large counter-opening from the sinus into the nose. This last procedure consists in the removal of the outer nasal wall lying under the inferior turbinated body. The opening under the lip which was made to permit the removal of the anterior sinus wall is now closed, and subsequent treatment is carried out through the nose.

In the case of the frontal sinus the radical operation consists in an external operation. The incision is made along the line of the eyebrow, and after the periosteum has been elevated the anterior wall of the sinus is removed and the nasofrontal duct is enlarged. Drainage is then passed through this opening into the nose and the external wound sutured. By extending the incision in a curved line downward around the inner canthus

one can, after elevating the periosteum, enter the ethmoid labyrinth from without, and in this way accomplish not only an exenteration of the ethmoid cells but also of the sphenoid sinus (Fig. 302).

These external operations are not the methods of choice for most cases of chronic empyema of the nasal sinuses. They are, as a rule, to be resorted to only in those cases where intranasal operations have failed either to cure the trouble or at least to

Fig. 302.—Drawing made to show line of incision through the eyebrow for making an external operation on the frontal sinus, also the extension of incision downward when the exenteration of the ethmoid cells is contemplated.

relieve the patient of the most annoying symptom, that of pain. Such operations, by supplying ample drainage, usually remove the danger of a more serious intracranial complication.

In the case which I am demonstrating the intranasal operation has been used. The first step was to remove the middle turbinated body. This was accomplished by making a horizontal incision through its anterior attachment. A wire snare was then passed over the anterior end and the entire turbinated body torn away (Fig. 303). At the same sitting most of the

anterior ethmoid cells were removed by using a biting forceps.
The operation was done under cocain, and the patient was re-
quired to stay over night at the hospital. The nose was not
packed, as there was no bleeding. Two weeks later the patient
returned to the hospital and an effort was made to secure ample
drainage from the maxillary and frontal sinuses. The opening
into the maxillary sinus was made by the removal of a large part
of the nasal wall lying above the inferior turbinated body. The
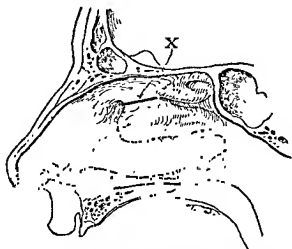opening which was made was approximately ½ inch broad and

Fig 303 —View of lateral wall of nose shewing normal relation of turbinated
bodies. Incision (X) through attachment of middle turbinated body prelimi-
nary to removal by snare

at least ¾ inch long (Fig 304) It required but a few seconds
to make this opening, and the patient offered no objection to my
going ahead with the operation of enlarging the normal opening
of the frontal sinus. The intranasal operation on the frontal
sinus is a much more difficult procedure than that of making a
permanent opening into the maxillary sinus. The danger of
penetrating the cribriform plate and of causing a meningitis must
always be kept in mind For obvious reasons, the intranasal
operation on the frontal sinus should not be attempted until the
operator has made himself quite familiar with the details of the

anatomic relations about this region. In this case the first step in the operation on the frontal sinus was the removal of the last remnant of the anterior ethmoid cells which had remained after the first operation. This was accomplished by the use of a biting forceps so constructed as to cut from behind forward. By keeping the point of the forceps directed outward as well as upward the cribriform plate was avoided, since this dangerous area lies close to the septum. One can in this way use all the force necessary to break through the thin walls separating the ethmoid cells.
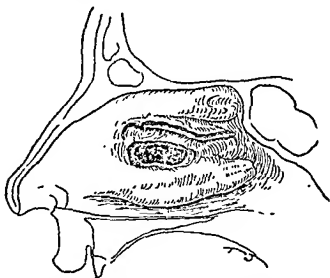
Fig. 304.—View of lateral wall of nose. Middle turbinated body removed showing opening made from middle meatus into maxillary sinus through what is known as the nasal fontanel—the least resistant part of the nasal wall of this sinus

There is no danger of entering the brain cavity because the bony plate which forms the roof of the ethmoid labyrinth and separates these cells from the brain fossa is quite firm.

The operation for enlarging the nasofrontal passage was accomplished by means of a frontal sinus rasp, which was introduced through the normal opening and the passage enlarged anteriorly. The success of this procedure is not the same in all cases owing to the varying anatomic conditions which one encounters. In this case I did succeed in providing a fairly large opening. No packing was required, and the patient left, the

hospital the following day. The most important after-treatment in such cases is directed toward preventing the opening into the frontal sinus from contracting as the result of granulations developing on the site of the operation. In this case the granulations were kept down by the application of 10 per cent. solution of silver nitrate at intervals of about five days. The application is made on a small pledget of cotton attached to a probe which is so curved that it can be passed upward and forward into the frontal sinus.

It is now six weeks since the second operation, and the patient is already practically cured of her annoying symptoms. The pain disappeared immediately after the last operation, and the discharge has already subsided to such an extent as to cause practically no annoyance. Irrigation of the frontal and maxillary sinuses washed out very little secretion. The patient will be kept under observation, and the application of silver nitrate repeated at intervals of ten days to two weeks until the granulations cease to form in the nasofrontal passage. I fully expect that the patient will eventually make a complete recovery.

A word as regards the reasons for preferring the intranasal to the external method of operating. In the first place, the intranasal operation is done under local anesthesia, which, for obvious reasons, is much safer than an operation in this region under ether. The intranasal work in the hands of those who have acquired a thorough knowledge of the anatomy of this region carries with it no greater risk than does the external operation. In the case of the frontal sinus the external operation always leaves a permanent disfiguring scar, which even in the most favorable cases is always conspicuous.

As regards the end-results, most of the cases even of long-standing empyema can be cured by the intranasal method. Of those cases which are not completely cured there are very few where the intranasal operation has not relieved the patient of the most annoying symptom, namely, pain, and removed the risk of a possible more serious intracranial complication. The external operation, especially on the frontal sinus, should be reserved for those cases in which, after the intranasal operation,

there still persist symptoms of obstruction to the outflow of pus, and especially where this obstruction is causing pain, or for cases where symptoms develop indicating a possible intracranial extension.

CASE III. SUPPURATIVE OTITIS MEDIA WITH PARALYSIS OF THE EXTERNAL RECTUS

The patient is a man sixty-eight years old who consulted me first in November, 1915. His one complaint was a profuse purulent discharge from the right ear, which had persisted since an acute purulent otitis media eight months before. The discharge from the ear was most profuse. The whole canal would become filled within a couple of hours after cleansing. The patient's general condition was good. He felt quite well. He had no discomfort in the region of the ear and there was no elevation of temperature.

The examination disclosed a perforation in the lower anterior part of the drum membrane. There was none of the narrowing of the inner part of the external canal which is so frequently found in cases where a mastoid abscess complicates an acute otitis media. There was no change over the outer surface of the mastoid and absolutely no tenderness on pressure. Transillumination showed a distinct shadow over the right mastoid which was not present over the left. A skiagraph showed a normal pneumatic mastoid process on the left, but a process completely free of pneumatic spaces on the right. The appearance of the right mastoid resembled very closely that found when the process is the seat of an extensive softening. Cultures from the pus disclosed pure culture of staphylococci.

The persistence of such a profuse discharge for over eight months, together with the distinct shadow over the mastoid on transillumination and the skiagraph findings, led us to believe that we were dealing with a mastoid abscess. It was decided, therefore, to open the mastoid and clean out the abscess cavity. The patient was given ether and the outer shell of the mastoid removed. To our surprise no abscess was discovered. The entire mastoid was free from pus, and throughout the entire

process there was complete obliteration of pneumatic cells. Not having discovered in the mastoid the cause for the profuse discharge from the ear, it was decided to explore the region of the tympanum. Accordingly, the simple mastoid cavity was turned into a radical by the removal of the posterior wall of the external canal. After this was completed the walls of the tympanum were carefully searched for a passage which should lead to the abscess cavity, for it was quite evident from the amount of discharge in this case that it could not come from the tympanum alone. The only suspicious area found was at the floor of the tympanum, in a space which is known as the recessus hypotympanicus This region was filled with granulations and distinct softening of the bone was detected. After cureting this region the posterior membranous wall of the external canal was slit so as to form two flaps. One flap was sutured above with catgut and the other below. The cavity was then carefully packed with iodoform gauze and the incision back of the ear closed with metal clips

The patient made a quick recovery from the operation, with primary union of the incision back of the ear. The operation, however, did not cure him of his profuse discharge, which continued about the same as before the operation. The continuation of the discharge was found to come distinctly from the lower and anterior part of the tympanum, that is, from the recessus hypotympanicus and the orifice of the eustachian tube. I became convinced that we were dealing with an abscess in either a large tympanic cell or a large cell which occasionally exists in the region of the eustachian tube and drains through it. When these cells become infected it is not always possible to eradicate the seat of the trouble, as we are able to do when mastoid cells become the seat of a persistent infection, the reason being that operative work about the floor of the tympanum is restricted because of the proximity of the bulb of the jugular, and operations about the mouth of the eustachian tube have to be undertaken with great caution because the internal carotid lies in this region. For these reasons I decided not to attempt another operation. Conditions developed, however,

which made a subsequent operation imperative. In spite of everything that we could do, a membrane gradually formed which closed off the anterior and lower part of the tympanic cavity. The patient did not live in the city and it was possible to see him only at irregular intervals. When I found it necessary to do a second operation I decided if possible to ferret out the abscess cavity from which the pus was pouring. The operation was undertaken.
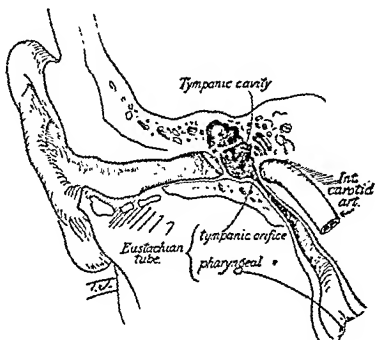
Fig. 305.—Semischematic drawing through the external auditory canal, cavum tympani, and eustachian tube intended to show the intimate relation which exists between the tympanic orifice and the eustachian tube and the internal carotid artery.

An incision was made along the line of the scar of the previous operation; the auricle was pulled forward so as to expose the tympanic cavity. The region of the floor of the tympanum was first thoroughly but cautiously explored and cureted by using curets with rounded tips. After this was completed I proceeded to explore, by the same cautious method, the tympanic orifice of the eustachian tube in order to discover any tubal cells that might exist in this region. The work in this

region was done with the position of the internal carotid clearly in mind (Fig 305). A strip of iodoform gauze was kept ready for a tampon should there be a chance injury of the internal carotid. A distinct softening of the bone was discovered in this region quite similar to that found during the first operation in the floor of the tympanum. I had all but convinced myself that all had been done which it was possible to do with safety when the operation was suddenly stopped by a flow of blood from the internal carotid. It was bright red and gushed up from the mouth of the eustachian tube. The strip of iodoform gauze which had been prepared for such an accident was quickly and firmly packed into the tympanic orifice of the tube and the bleeding completely stopped. The opening back of the ear was again closed and the entire cavity packed with iodoform gauze. I naturally felt that I had accomplished all that it was possible for one to do in this region.

On the second day after the operation the patient began to complain of seeing double, and it was found that he had developed a partial paralysis of the external rectus of the right eye In another twenty-four hours there was a complete paralysis of this muscle. I felt that it was probable that the firm packing which I had placed in the tubal orifice might have something to do with this paralysis. The packing in the mastoid opening was then removed and the gauze cautiously withdrawn from the orifice of the eustachian tube. No bleeding took place. The iodoform packing was again inserted, but less firmly, and after a few days more this was left out altogether.

Paralysis of the external rectus is occasionally observed as a complication of mastoiditis. It appears to be the result of an extension of the inflammatory process to the apex of the petrous bone, where it succeeds in producing a circumscribed area of meningitis, sufficient at least to involve the sixth nerve, which lies in contact with the temporal bone in this region. The paralysis is, as a rule, temporary and gradually disappears. I have seen several such cases, and in all of them the paralysis has cleared up.

This patient complained a good deal of headache over the right temporal region, which continued for several weeks after the operation. He made, however, a quick recovery from the effects of the operation, but for months there persisted a profuse discharge coming from the region of the tympanic orifice of the eustachian tube. Early in October, 1916, he began to detect a diminution in the amount of the discharge and about ten days later it had ceased entirely. Since then there has been no return of the discharge. The entire mastoid cavity is quite dry and the mouth of the eustachian tube has been completely closed by a firm dry scar. Repeated examinations of the nasopharynx have failed to detect any evidence of pus escaping from the pharyngeal orifice of the eustachian tube, although the patient thinks he has more annoyance, especially at night, from secretion accumulating in the pharynx.

The paralysis of the external rectus began to disappear about three months after the operation, but did not clear up entirely until it had been present about eight months. The annoyance from double vision was relieved by using an opaque lens for the right eye. During all this time the patient's general condition has been good. At no time has there been any evidence of systemic poisoning from the infection in the ear.

CASE IV. CHRONIC INFECTION OF THE SUBMAXILLARY GLAND

The patient is a man fifty-seven years old who complains of a painful swelling under the angle of the jaw on the right side and another under the tongue in the floor of the mouth. The trouble developed last evening with a swelling of the right submaxillary gland. This morning he began to notice a soreness under the tongue. The submaxillary gland on the right side is found to be about the size of a pullet's egg and is slightly tender on pressure. The opening of the duct under the tongue is found blocked by a grayish-white lump which does not seem to be a concretion, but rather a thick clump of mucus (Fig. 306). This cannot be expressed until the opening has been slit. A bougie is then passed for a couple of inches into the duct, and its withdrawal is followed by the discharge of about 1 dram of

milky fluid. Pressure on the swollen gland at the angle of the jaw forces out a little more of the same fluid. After this manipulation the patient experiences immediate relief from the feeling of tension and pain over the swollen gland and in the region under the tongue.

The patient has had similar trouble before. He states that that first attack was about two years ago. This developed in

Fig 306.—Sketch showing the dilated orifice of the opening under the tongue of the duct of the submaxillary gland in which is lodged a concretion (A) B, The swelling of the submaxillary gland caused by the infection with retention of secretions

exactly the same manner as the present attack, with a swelling of the right submaxillary gland. The swelling gradually disappeared without treatment. The second attack came on just one year ago, when he consulted me about two weeks after the swelling of the gland had occurred. At that time he presented the same symptoms as in the present attack, with the same whit-

ish tenacious plug blocking the opening of the duct under the tongue. The passage of a bougie into the duct was followed by a discharge of milky fluid. This treatment was repeated as often as the patient experienced a return of the symptoms of retention over the gland. This was usually at intervals of ten days or two weeks. It was not until a couple of months later that this swelling of the gland entirely disappeared.

The patient is a victim of a form of chronic tonsillitis, and gives a history of recurring attacks of acute tonsillitis with an occasional attack of quinsy sore throat. The tonsils, as is usual in such cases, are quite hard from overdevelopment of connective tissue, and it is exceptional when pus cannot be expressed from the right tonsil. It seems possible that the infection of the submaxillary gland may have been brought about by the discharge of pus from the infected tonsils.

CASE V. CHRONIC EMPYEMA OF THE MAXILLARY SINUS

The case is that of a man who consulted me in March, 1911. He was then forty-four years of age, and complained of a bad-smelling, purulent discharge from the left side of the nose. This trouble had developed suddenly seven months previously, when he suffered from alveolar abscess around the second upper bicuspid on the left side. During the course of this trouble he developed pain over the region of the antrum and nasal symptoms, consisting of bad-smelling discharge and obstruction in the left side of the nose. The nasal symptoms persisted after the extraction of the diseased tooth. In this case the examination found the right side of the nose quite normal, but on the left side a creamy pus was found oozing out from under the middle turbinated body. The mucous membrane over the free edge of the middle turbinated body was congested and distinctly oedematous. Transillumination disclosed a marked shadow over the left antrum, the left pupil dark, and subjective light sensations on the right side only. The frontal sinuses on both sides were equally clear. On tipping the head forward pus reappeared in the middle meatus.

This examination disclosed an empyema of the left maxillary

sinus, not combined with the frontal sinus infection, as in the previous case. The normal opening of the maxillary sinus *is at its upper border*. By tipping the head forward and to the opposite side secretion from the maxillary sinus, if such is present, will flow out of the normal opening. Under a local anesthesia the overlapping middle turbinal body was removed and a large opening made into the maxillary sinus above the lower turbinated body. The opening was ⅔ inch broad and perhaps 1 inch long. In making the opening into the maxillary sinus in this region one must be careful not to operate too far forward, as there is danger of injuring the lacrimal duct, which may result in occlusion of the latter so that the tears will run out over the cheek. The opening can be made as far posteriorly as the posterior wall of the sinus. The sinus was thoroughly washed out but the once, and the patient not living in the city I did not get a chance to see him again until December, 1916, when he reported that the discharge from the nose had not returned after the operation and he had ceased having any of the symptoms for which he consulted me. Examining the nose, I found the nasal passages were clear, the opening into the maxillary sinus was still patulent. No secretion in the sinus was washed out by irrigation. Transillumination tests showed perfectly clear maxillary sinuses on both sides. In other words, the patient has had a complete cure of his chronic empyema of the maxillary sinuses by establishing a permanent large opening into the nose.

It has often been supposed that an opening into the inferior meatus is of greater value than one into the middle meatus of the nose, because the former opening lies nearer the floor of the maxillary sinus and supplies better drainage. As a matter of fact, however, I have found that a large opening into the middle meatus is much more easily made and gives just as satisfactory results as an opening below. Apparently it is the securing of free ventilation which is the important factor in these cases, and the ventilation from the middle meatus is just as satisfactory as though the opening were made below the lower turbinal.

CASE VI. LUDWIG'S ANGINA

This patient is a young man, twenty-one years old, whose complaint consists of a swelling involving the floor of the mouth and the glands of the neck, together with intense pain in this region and inability to close the mouth, from which there is a constant, profuse flow of mucus. There is also complaint of great pain and difficulty in swallowing.

His trouble developed about a week before admission to the hospital as a sore throat, with slowly developing swelling of the tissue in the floor of the mouth which was associated with the enlargement of the glands under the chin and at the angle of the jaw, especially on the right side. The infiltration in the floor of the mouth is hard, board-like, and rises quite to the level of the lower teeth. The elevation of the tongue brought about by this infiltration renders it impossible for him to close the mouth. The patient complains of a swelling of the tongue, and the elevated position of this organ suggests that it is also involved, but it is probable that the tongue is merely pushed upward by the swelling of the tissues underneath. The mucous membrane on the floor of the mouth as well as the sides of the tongue is covered by a dry whitish exudate. It is not possible to get even a glimpse of the faucial tonsils. There are two areas where infiltration is particularly hard. One is directly under the median line of the chin, the other is beneath the angle of the jaw on the right side. There is very little discoloration of the skin over the swollen region and no evidence of fluctuation. The temperature ranges between 101° F. and 103° F. There is a leukocytosis of 16,350. Cultures from the secretion in the mouth show almost a pure culture of streptococcus.

The treatment consists of hot moist dressings about the neck, an alkaline mouth-wash, and the administration of morphin to relieve the pain.

Subsequent History.—On the sixth day after admission to the hospital, and about two weeks after the onset of this trouble, the pain in the floor of the mouth rapidly became much more severe. In the course of an hour or two pus suddenly began to ooze from an opening somewhere under the tongue. In a very short time

the patient had expectorated about 20 c.c. of yellow pus with a
very offensive odor. Cultures from this pus showed streptococci
in chains and pairs and a short thin bacillus. The relief following
the discharge of pus from the mouth was immediate and very
marked. The infiltration under the chin continued to increase
in size and hardness. Four days later this was opened and about
2 drams of thick yellow pus allowed to escape. The recovery
after the escape of pus from this point was very rapid.

CLINIC OF DR. CHARLES A. PARKER

THE HOME FOR DESTITUTE CRIPPLED CHILDREN

— —

ACUTE SUPPURATIVE DESTRUCTION OF THE UPPER FEMORAL EPIPHYSIS—SO-CALLED EPIPHYSITIS

Summary. Report and demonstration of cases illustrating an acute inflammatory process in the upper end of the femur leading to the destruction of the epiphysis and disappearance of the head, three clinical types, prognosis—mortality fairly high in severe cases, flexion—adduction deformity usual following subsidence of acute symptoms, complete ankylosis rare, treatment — careful immobilization during acute stage with drainage in selected cases, deformity in late cases corrected under general anesthesia without open operation, if possible, subtrochanteric osteotomy indicated if satisfactory correction cannot otherwise be obtained, arthroplasties usually contraindicated.

THIS patient, P. N., is a child two years old, who was brought to the hospital February 14, 1917, with the following history:

In August, 1916, he was taken to the Cook County Hospital on account of an attack of acute poliomyelitis While in the hospital it was noticed that the right hip was stiff and painful, but no special treatment was given, as the poliomyelitis was considered the prominent factor. On admission to this hospital the child was able to stand, but not to walk. The right hip was flexed, and the extensor muscles of the thigh were completely paralyzed as the result of his attack of infantile paralysis A skiagraph of the hip showed a complete loss of the femoral head and partial destruction of the neck (Fig 307) As his suffering was not acute and his general condition good, a plaster cast was applied to the hip and body for immobilization and relief of deformity. The symptoms became acute, and today we open the fluctuating area about the great trochanter (makes incision through skin and into abscess) and evacuate several ounces of pus. A drainage-tube is inserted and the wound dressed. No

the patient had expectorated about 20 c c. of yellow pus with a very offensive odor. Cultures from this pus showed streptococci in chains and pairs and a short thin bacillus. The relief following the discharge of pus from the mouth was immediate and very marked   The infiltration under the chin continued to increase in size and hardness. Four days later this was opened and about 2 drams of thick yellow pus allowed to escape. The recovery after the escape of pus from this point was very rapid.

erect and walks with only a slight limp. The leg is now apparently full length, although it is still actually $1\frac{1}{2}$ inches short (Fig. 312).

CASE 4.—S. D., male, aged two years, entered the Home for Destitute Crippled Children December 17, 1915.

Fig. 310.—Case III· J. L., aged eighteen years. Showing remnant of neck of right femur anchored in a secondary socket on the ilium. The adduction deformity is quite marked.

Ten months before admission to the hospital the child had fallen from a chair, after which he was unable to walk, although he had walked previously. The patient lay with the right thigh flexed on the abdomen and crossed over to the left side. A skiagraph showed complete absence of both head and neck of the femur, with backward and upward displacement of the shaft. There were no sinuses or scars and no history of a discharging sinus (Fig. 313).

Under general anesthesia the leg was brought down nearly to the normal position and put in a plaster cast This was

Fig 311 —Case III, J L Showing the right hip in a cast after operation The line of section is distinct and the abducted position of the limb is well shown

changed at intervals until the position of the leg was considered satisfactory

This patient recently died from a cerebral lesion, probably of an infectious nature.

Case 5.—L. T., male, aged four years, entered the Home for Destitute Crippled Children January 17, 1917.

When eight months old the patient fell out of bed, striking on the right side of body. The mother says that the hip did not become swollen and that the child had no fever. He did not walk until he was twenty-five months old. Then he walked
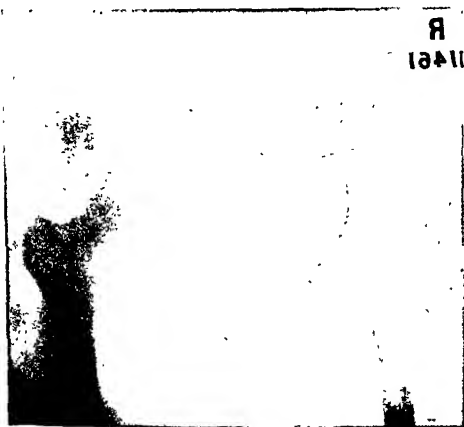
Fig. 312.—Case III, J. L. A recent skiagraph showing both hips in their new relation and the line of section becoming indistinct

with a limp. He was given medicine for rheumatism. On examination, the right hip was found to be flexed and abducted. There were no scars nor sinuses and no history of abscess. A skiagraph showed a shortened and deformed neck, with the presence of a defective epiphysis in the acetabulum. Perhaps this was a fracture, but the history and symptoms are so similar to the other cases that it is included as a doubtful case, in which

possibly there was an infectious process which did not succeed
in entirely destroying the epiphysis, although it did seriously
damage the neck.   The child is now wearing a cast on account
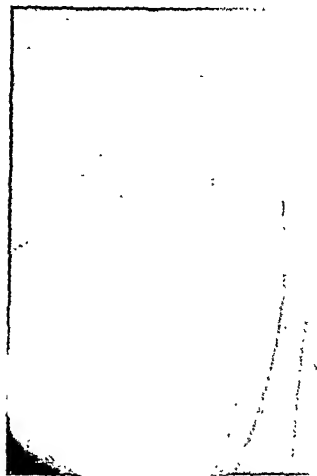of tenderness in the joint (Figs. 314 and 315).

Fig 313 —Case IV S D , aged two years   Entire absence of upper epiphysis
of right femur with displacement of shaft   No evidence of spontaneous or opera-
tive drainage

The occurrence in children of an acute inflammatory process
in the upper end of the femur, leading to the destruction of the
epiphysis and disappearance of the head, is not rare in the ex-

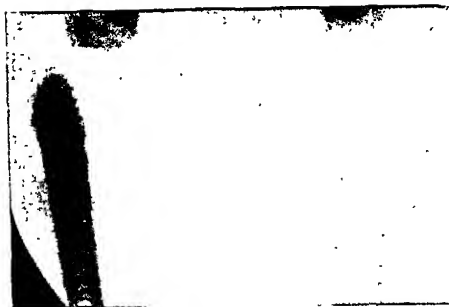Fig 314—Case V L T, aged four years Showing upper end of right femur with the epiphysis complete and in the acetabulum and the shortened defective neck The original skiagraph was taken with a reversed plate, so the print is deceptive in apparently reversing the joint affected.

Fig 315—Case V, L. T. Showing the defective neck of the right femur with the pathology less distinct than in Figure 314.
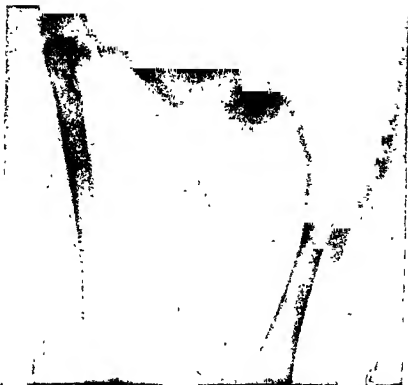
Fig 316—E S, aged two and one-half years Destructive changes both hips In the left hip the epiphysis is intact and in the acetabulum. In the right hip it is apparently absent, although the rather long fragment of the neck is in the acetabulum The left hip resembles closely the right hip of Case V (Figs 314, 315)

perience of surgeons handling many joint cases The ensuing deformity likewise not infrequently comes for relief.

PATHOLOGY AND CLINICAL TYPES

The pathologic process is probably always primarily an osteomyelitis of the upper portion of the shaft of the same general nature as similar processes elsewhere, but the early death of the epiphysis within the joint, due to its lack of sufficient vascular ligamentous attachments after destruction of the supporting neck, makes the resulting catastrophe unique and one meriting special consideration

It is usually a secondary infection, as is osteomyelitis in

general, and the organism most commonly found is a staphylococcus.

Mild infections accompanied by fever, tenderness, and disturbance of function, but not proceeding to epiphyseal destruction or permanent joint changes, not infrequently occur in this region. Rest of the part results in a gradual subsidence of symptoms and complete restitution of function.

Next in severity is the type in which destruction of the epiphysis and displacement of the upper end of the femur takes place, but in which the process subsides without a discharging abscess. Usually these patients are seen long after the acute process has subsided, and the diagnosis must be made from the history of previous acute trouble in the hip, from the absence of local scars, and from the *x*-ray findings. This was the condition in three of our cases. In one of these a diagnosis of congenital dislocation of the hips had been made previous to obtaining good skiagraphs of the joints. The process is frequently an insidious one, the symptoms being disguised by more patent and severe processes going on elsewhere at the same time.

Thirdly, there is the extreme type with severe local and general symptoms followed by a discharging abscess, opened either spontaneously or by the surgeon, and showing the same destruction of the head and displacement of the shaft as in the intermediate group, but with the addition of the sinuses, or scars of their former presence.

SYMPTOMS AND DIAGNOSIS

The condition is necessarily limited to the years of epiphyseal growth, and the largest number of cases have occurred between the ages of seven and seventeen years, with a preponderance in males of 3 to 1 during the first three years of life, after which it is about equally divided between the sexes. In my experience it has been practically limited to infancy or early childhood.

The diagnosis depends to a considerable extent upon the force with which the attention is directed to the hip-joint.

In one of the cases here reported (Case 2) a history of

"meningitis" at one year of age, with no knowledge of hip trouble, was elicited from the mother after much questioning. In this case both hips were affected, and recovery had followed without a discharging abscess. This was later mistaken for a case of double congenital dislocation of the hips.

In another instance (Case 1), the one before you today, the child was in the County Hospital with a diagnosis of infantile paralysis when the hip condition was first noticed. There was total paralysis of the extensor muscles of the thigh and limited motion of the hip-joint of the same side. The hip was painful, but the symptoms were not acute. Today—that is, several months later—the child is brought to the clinic with an acute exacerbation of the hip trouble and a large abscess around the upper end of the femur. An x-ray shows loss of the epiphysis. The abscess we have just drained, but the paralysis remains.

In Case 3 the young lady states that her parents told her that when she commenced to walk they noticed that her right hip was deformed and that she has always walked lame. No sinuses have ever been present.

In Case 4 the child fell from a chair when a little over a year old and has not walked since, eight months after the injury. Here there is marked deformity of the hip, but no evidence of a discharging abscess or present infectious process. The x-ray shows destruction of the head and neck and involvement of the shaft.

In Case 5 there is also a history of injury with attention directed to the hip. The child fell out of bed when eight months old and did not walk until he was twenty-five months old. In the meantime he was treated for rheumatism. It is stated that the hip was not swollen. There is no evidence of a discharging abscess. The x-ray shows a distinct deformity of the neck, with shortening and the presence of the defective epiphysis in the acetabulum. This picture is different from the others and may cast doubt on the diagnosis, but the history is so similar to the rest, and the x-ray so suggestive of inflammatory action, that the case is tentatively included in the group as a possible form in which the epiphysis escaped its usual fate. Trauma is thus strongly suggested as a localizing factor in the infection.

The process is always fairly acute, although the symptoms may be greatly obscured by diverting conditions elsewhere or the comparative mildness of the local reaction. However, an acute inflammatory disturbance of the hip following a trauma in a child should put us on our guard as to the probability of the process being destructive in character. Extreme general toxicity is present in the severer cases, while pain and swelling with high fever are present early and evidence of pus soon appears.

The x-ray may at first show no definite change in the structures except possibly a beginning separation of the joint surfaces from accumulating fluid. Later the picture is quite characteristic, with the altered or absent epiphysis and the displaced and deformed neck and shaft of the femur. The acuteness of the whole affair distinctly differentiates it from a tuberculous process. The active disease usually completely subsides in a much shorter time than it takes a tuberculous process to heal, although discharging sinuses may remain.

PROGNOSIS

It is difficult to determine the mortality of a condition as frequently unrecognized in the acute stage as is this one. Most of the cases first come to the doctor to be treated for the deformity, sometimes without any recollection of a preceding acute process.

In only 1 of 3 acute cases which I have observed and upon which I have operated do I know that the death resulted from this condition. One left the hospital a few days after the operation and its fate is not known. The third is the one operated upon today. Of the 5 cases here reported, 4 had passed through the acute period before coming to my service. Statistics, however, show the mortality rate to be high, which is quite natural for so severe an affection in young children.

RESULTS

The function of the hip-joint is usually greatly impaired. The stump of the neck or the shaft is often displaced on to the dorsum of the ilium, where it may secure an efficient lodgment in

the reparative development on this surface, as is well shown in Case 3, Fig. 310.

I have never observed complete ankylosis, although the movements of the joint have generally been considerably limited. The hip is usually flexed and adducted, often to a position of extreme deformity. Walking is usually possible, although often greatly interfered with. A lighting up of the old process occasionally occurs.

TREATMENT OF THE ACUTE STAGE

During the acute stage the treatment is that of osteomyelitis in general with the complication of joint infection. In the extreme cases with severe general and local symptoms immediate opening of the bone and the joint are necessary to save life, though loss of the epiphysis and impairment of the joint are practically sure to occur.

If the focus in the bone can be reached early enough the joint may not have to be opened and the epiphysis may possibly be preserved, but the opportunity for this, unfortunately, is rare. When the joint is opened the epiphysis is usually removed to enhance healing.

There are many mild cases in which the whole process subsides after a period of rest and the joint completely recovers its function without operation.

Between these two classes of cases is the insidious type, with a minimum of local and general symptoms, yet followed by destruction of the epiphysis and joint injury. This class is frequently seen after the acute symptoms have disappeared and the resulting deformity has occurred. It subsides with or without the occurrence of a discharging abscess.

It is generally inadvisable to open the joint in these cases, as the results from spontaneous healing are usually quite as good as those following operations upon the joint, and in those healing without discharge the results are much better. Opening down to the neck or shaft of the femur in the early stages in an effort to abort the process is a rational procedure. Removal of the epiphysis itself in young children is seldom called for, as

the destructive process usually so completely destroys it that it cannot be found by the x-ray and no doubt is soon entirely disintegrated. In all cases careful immobilization of the joint in the proper position by suitable apparatus during the time of treatment is indicated.

TREATMENT OF THE DEFORMITY

The orthopedic surgeon is more frequently consulted for the resulting deformity than for the acute disease. The thigh is usually held more or less fixed in a position of flexion and adduction. This may be so severe as to cross one leg over the other with the thigh approximated to the abdomen.

When there is no further evidence of the presence of the original infection, the thigh should be brought down to its normal position of extension under general anesthesia, and slightly abducted and held in a plaster cast until it shows a disposition to retain this position when the cast is removed. Frequently this cannot be accomplished without a subtrochanteric osteotomy, which should always be done when the position cannot be obtained and maintained otherwise. This is done with an osteotome, through a small longitudinal incision not over 1 inch long, just at the lower margin of the great trochanter. The osteotome is entered in the line of the incision and pressed down to the bone, when the edge is turned across the axis of the femur and driven through the bone until the latter is easily broken. The limb is then brought into the desired position of extension and abduction and held with a plaster-of-Paris cast until healing is secure.

Figures 308 to 312 show the bone before and after osteotomy. Standing and walking are very much improved by this treatment. In Case 3 the practical shortening before operation was 4½ inches, while after the operation it was *nil*, the position of abduction entirely compensating for the 1½ inches of real shortening present. Operative procedures to replace the neck of the femur in the acetabulum or to reconstruct the joint are usually unsuccessful, as in addition to the

difficult mechanical problems to overcome these joints are very prone to reinfection after operation.

NOTE.—Since this clinic was given there has recently come on my service in the Cook County Hospital another case of this condition showing a combination of results in the same patient that is very instructive. The child, E. S., is two and one-half years old and cannot walk. It was noticed by the parents that when the child began to walk at fourteen months it dragged the left leg. About four months ago it became unable to walk, and lay with both thighs flexed on the abdomen, in which condition it was brought to the hospital.

The child was fairly well nourished and did not appear to be acutely sick. With a little petting the left leg could be straightened out entirely and movements appeared to be normal. The right hip, however, was painful and resisted manipulation. A skiagraph showed the remarkable condition seen in Fig. 316; the upper part of the shaft and the neck of the femur are distinctly affected by the inflammatory process, now quiescent, while the head of the right femur is absent and the neck lies in the acetabulum. No sinuses nor evidence of abscesses were present.

This strengthens my opinion that Case 5 (Figs. 314 and 315) was due to a similar process and not to a fracture, and is a modified and favorable result of these inflammatory conditions.

CLINIC OF DR. PAUL OLIVER

COOK COUNTY HOSPITAL

EPITHELIOMA OF THE CHEEK

Summary: A patient presenting a lesion of two years' duration which has steadily increased in size in spite of a variety of local "treatments"; gumma and hypertrophic tuberculosis ruled out by the history and the character of the lesion; local adenopathy due to secondary infection, treatment

THIS man, a carpenter, entered the hospital January 15, 1917, because of a growth on the left cheek. He stated that this began two years ago as a small papule in the skin and that it grew slowly. What he describes as small seeds would appear on the surface, dry up, and drop off. In one year's time it had grown to the size of a large pea, when it was cauterized with acid by a physician. This reduced it to an ulcerated surface covered by a crust. The mass recurred, and the patient has repeatedly applied glacial acetic acid during the past year. In spite of this there has been gradual extension with more rapid growth lately. He has been applying a salve which has destroyed the growth and left a crater-like, raw surface. There has never been pain until three months ago, when it became suddenly swollen and painful due to infection. He has worked until a few weeks ago, feels strong, and eats well. He thinks he has lost only a little in weight. Previous history is negative. Denies luetic infection.

On examination, we note that the center of the left cheek is the seat of a crater-like ulcer, fairly circular in outline and about 5 cm. in diameter (Fig. 317). The entire side of the face is swollen and dusky red, the eyelids edematous, and the left eye nearly closed. The margin of the ulcer is irregular, thick, raised, and everted. The floor in the center is depressed to a depth of about 3 cm. It is covered by a dirty yellow, foul-

smelling exudate. The mucosa of the cheek is infiltrated but
not perforated The wall of the crater is firm—not hard.
The lesion involves all the tissues of the cheek and is fixed to
the superior maxilla. Posterior to the ulcer are noted several

Fig 317—Ulcerating epithelioma of cheek with marked secondary infection Note evidences of inflammatory edema of surrounding tissues with especial involvement of the eyelids

pin-head suppurating spots The lymph-glands of the sub-
maxillary triangle are about the size of beans and fairly soft
    The patient states that a diagnosis of lues had been made—
presumably gumma The duration of the process is too long
for a gumma and the firm raised margins of the lesions are not
like those of a gumma Hypertrophic tuberculosis might

be considered. If such were the case, however, we would expect some scar tissue as evidence of healing in the older parts. The ulcer is not superficial and does not have the soft undermined margins which we might expect in tuberculosis. The history of the lesion and findings fit in best with epithelioma. It is probably an epithelioma of the basal-cell variety. The nature of the primary growth and the absence of hard, round regional lymph-nodes would speak for this. The secondary infection probably accounts for the lymph-nodes' involvement, the nodes being rather soft and ovoid. The rate of growth, which seems rapid for a rodent ulcer, might be accounted for by the repeated irritation of the caustics applied by the patient.

The seed-like particles of which the patient speaks make us think of epithelial pearls, which are uncommon in basal-cell epithelioma. A positive diagnosis can be made by microscopic section. There can be little doubt, however, that we have to deal with an epithelioma complicated by a secondary pus infection.

I have advised this patient first to have the infection cleaned up, and then to submit to operation, this to be followed by roentgen-ray treatment. In the operation it was my intention to ligate the external carotid artery, and then to excise the growth widely with the cautery. The patient has refused operation, electing to try the roentgen ray first.

by means of alligator forceps It was a mulberry stone, and
measures 15 x 11 x 8 mm. Roentgen-ray plates of both kidneys
and ureters show no shadows indicating other stones.

This stone probably was formed in the pelvis of the kidney,
and its passage along the ureter with blocking of the ureter gave
rise to the acute colic. The pain in the lumbar region was due
probably to the distention of the kidney pelvis, while the pain
in the iliac region was due to the direct irritation of the stone

Fig 318 —Calculus after removal from urethra. Dimensions, 15 x 11 x 8 mm

lodged in the lower ureter. This case simply illustrates that a
stone of fair size will pass through the ureter, and that it is
well to delay operation until a reasonable time has been allowed
for this to occur For the ureter to allow such a stone to travel
its entire length in three days indicates that it is capable of rapid
distention much beyond its normal caliber

This case is also an example of one of the less common causes
of acute retention of urine in adults

CARCINOMA OF THE STOMACH

Summary: Obstruction at cardiac end of esophagus due to advanced carcinoma; symptoms and physical signs; the diagnosis; gastrostomy.

THIS patient is a laborer, forty-eight years of age, who was admitted to the hospital September 18, 1916, complaining of pain in the abdomen, difficulty in swallowing, great loss of weight, and constipation. He had never been sick until six months ago except for colds and occasional headaches. At one time in Poland he had chills and fever. He has been in the United States one year, speaks no English, and the history was obtained with difficulty even through an interpreter.

The history obtained states that six months ago he began to have trouble while working on shipboard. His appetite was fair and food did not distress him severely. He had continual abdominal pain, which began insidiously and gradually grew worse. He says his food seemed to stick. He was able to swallow, but there seemed to be some obstruction to the passage of food. There was no pain on swallowing nor any increased pain after eating. He weighed 165 pounds six months ago. His present weight is 104 pounds. He has a slight cough and raises some mucus. The bowels are constipated and have not moved in four days. He drinks moderately and smokes to excess. Venereal infection is denied. When he came to the hospital he was able to take liquid food. There is no history of vomiting or distress after eating. While under observation it was noted that practically all food taken was regurgitated a few moments after swallowing. He ate the meal slowly, and then shortly began to regurgitate.

This would indicate a lesion low in the esophagus.

You note that he is a very much emaciated man. He shows not only this emaciation but also marked brownish pigmentation of the skin. The skin is flabby and dry, with absence

of the subcutaneous fat. He also appears somewhat cyanotic. The pulse is quite weak, rather rapid, and of low volume. There is marked prominence of the bones, clavicles, ensiform, and pelvis. The lymph-glands stand out because of the loss of subcutaneous adipose tissue. His trouble seems to center in the abdomen. We note a scaphoid abdomen, some pigmentation, and evidence of a rupture. There is noted in the median line just above the umbilicus a nodule about the size of a split pea. I find other nodules just beneath the skin. The one in the median line seems to be in the skin. The smaller ones are about the size of No. 8 shot and are hard   There seems to be some fulness in the left hypochondrium when compared with the right. In the right hypochondrium the liver edge can be palpated two fingerbreadths below the costal margin. It is hard and rather irregular. A hard tumor-mass can be felt descending from under the left costal margin on deep inspiration. It is hard and nodular and about the size of a fist. It extends beneath the ribs beyond the palpating fingers   There is no rigidity of the abdominal muscles, and because of the emaciation the mass can be definitely palpated and is freely movable with respiration. Tension of the abdominal muscles obliterates the mass. No tenderness is present and there is no free fluid in the abdomen. To percussion a tympanitic note is elicited in the left hypochondrium   Such a tumor mass might be connected with the spleen, left kidney, or stomach. This case might be a portal cirrhosis with enlarged spleen. The area of splenic dulness is not increased, however. The mass does not give the hard sharp margin of an enlarged spleen, but is nodular and rounded. The history also speaks against such a condition.

If this were a kidney tumor it would most likely be a hypernephroma, which is the most common kidney new-growth occurring in adults. We should expect to find the growth principally in the lumbar region palpable posteriorly and with enlargement downward in the flank. We would also expect urinary symptoms and signs.

Carcinoma of the splenic flexure of the colon would be more fixed and probably give more definite symptoms of obstruction.

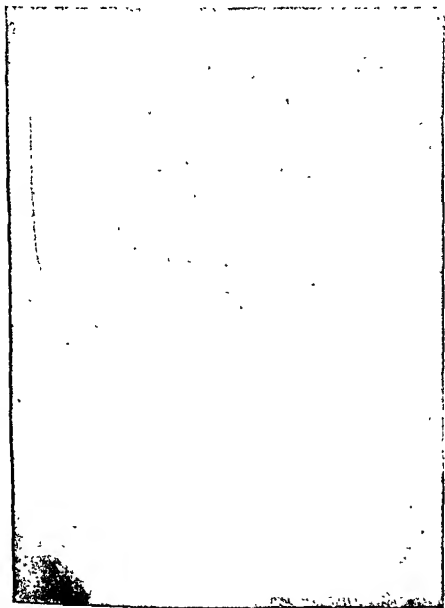All symptoms and signs point to an involvement of the stomach and esophagus.

Fig. 319.—Roentgenogram after barium meal, showing marked obstruction at lower end of esophagus due to anatomic narrowing.

On further examination, small hard nodules can be felt between the ensiform and umbilicus inside the abdomen. There is no palpable gland in the supraclavicular fossa.

of the subcutaneous fat. He also appears somewhat cyanotic. The pulse is quite weak, rather rapid, and of low volume   There is marked prominence of the bones, clavicles, ensiform, and pelvis. The lymph-glands stand out because of the loss of sub-cutaneous adipose tissue. His trouble seems to center in the abdomen. We note a scaphoid abdomen, some pigmentation, and evidence of a rupture. There is noted in the median line just above the umbilicus a nodule about the size of a split pea. I find other nodules just beneath the skin. The one in the median line seems to be in the skin. The smaller ones are about the size of No. 8 shot and are hard. There seems to be some fulness in the left hypochondrium when compared with the right. In the right hypochondrium the liver edge can be palpated two fingerbreadths below the costal margin. It is hard and rather irregular   A hard tumor-mass can be felt descending from under the left costal margin on deep inspiration. It is hard and nodular and about the size of a fist. It extends beneath the ribs beyond the palpating fingers   There is no rigidity of the abdominal muscles, and because of the emaciation the mass can be defi-nitely palpated and is freely movable with respiration. Tension of the abdominal muscles obliterates the mass. No tenderness is present and there is no free fluid in the abdomen. To per-cussion a tympanitic note is elicited in the left hypochondrium. Such a tumor mass might be connected with the spleen, left kidney, or stomach. This case might be a portal cirrhosis with enlarged spleen. The area of splenic dulness is not in-creased, however. The mass does not give the hard sharp margin of an enlarged spleen, but is nodular and rounded The history also speaks against such a condition

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Carcinoma of the splenic flexure of the colon would be more fixed and probably give more definite symptoms of obstruction.

nodules in the liver and the mesenteric lymph-nodes are large and hard. No free fluid is present.

An uninvolved part of the stomach wall is picked up and a purse-string suture of chromic gut inserted. A small incision is made in the center of the area surrounded by the purse-string. It is noted that only the serosa and muscularis have been penetrated. It is necessary to pick up and incise separately the mucosa. On account of the loose attachment of the mucosa I have noticed difficulty in attempting to penetrate into the lumen with a single puncture of the knife. We then insert a No. 25 (French) catheter and draw the purse-string suture tightly about it. A second purse-string is inserted about $\frac{1}{2}$ inch from the first. Several Lembert sutures attach the stomach wall with the catheter to the peritoneum and fascia. The abdominal wall is closed as usual, with the catheter projecting from the center of the incision.

NOTE.—*Postoperative History.*—Feeding of liquids through the tube and by rectum was commenced at once. The patient, however, continued to lose, and finally died November 3, 1916, about a month after operation. Autopsy was not obtained.

BILATERAL RENAL CALCULI

Summary: Signs and symptoms of renal calculi and methods of examination as illustrated by the present case, instrumental dilatation of ureters to assist passage of stones, pyelotomy.

THIS man is a machinist, thirty-five years old, He entered the hospital February 27, 1917, with the complaint of pain in the right side, radiating to the genitalia, nausea and vomiting, hematuria, pollakiuria, and diminished urinary stream.

He felt perfectly well until three weeks ago, when he had an attack of pain in the right lumbar and hypochondriac regions which radiated to the penis, and, after lasting two and a half hours, was relieved by taking medicine. The abrupt stopping of the attack was preceded by a sharp, cutting pain in the penis. He felt immediate relief, but did not notice whether or not a stone passed with the urine.

His present attack began February 27th about 3 A. M , with a sharp pain in the right lumbar region. It was colicky in character and persisted all day without intermission. It extended around to the abdomen, and on urination radiated down the penis and scrotum. He was nauseated several times, but vomited only once. There was considerable retching.

There has been blood in the urine with both attacks. Five days before this attack the urine was bright red with blood. Patient states that there has been blood in the urine every few months during the past five or six years. He often passes clots and white bits of tissue at the end of urination. There has been frequency of urination during the present attack. Previous to this he was in the habit of getting up once or twice at night. The day he entered the hospital he had two chills and his appetite was poor He further states that he has often had pain in the left lumbar region during the past five or six years. but not severe enough to keep him from work.

Habits.—Drinks whisky in moderation and smokes cigarettes to excess.

He had typhoid fever twelve years ago. He has had hemorrhoids for the past nine or ten years. He had gonorrhea fifteen years ago. He denies lues

Fig 320 — Roentgenogram showing stones in intravesical portion of right ureter

Examination showed the patient to be well developed and not acutely ill There was slight abdominal tenderness on the right, but no rigidity, and the kidneys were not palpable. Rectal examination was negative

On examination of the x-ray plates we note two shadows just below and internal to the right ischiac spine, in the region of the lower end of the ureter (Fig. 320) The size and irregular shape of the lower shadow speaks for a stone in the ureter, and against these shadows being calcified areas in vessels or
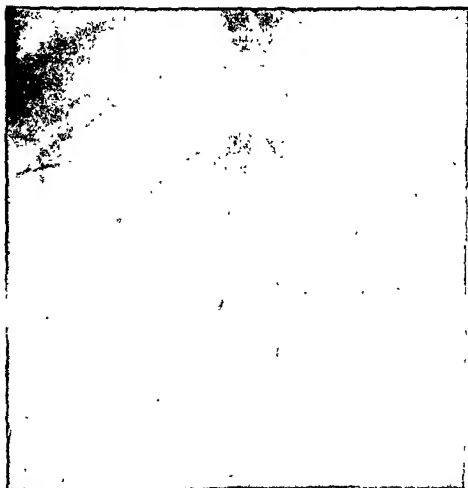

Fig. 321.—Roentgenogram of left kidney region. Note shadow of calculus at about the middle of the twelfth rib

lymph-nodes. The plate of the left kidney shows a shadow, triangular in shape, 2.5 by 2 cm., well out from the median line behind the twelfth rib (Fig. 321). This is pretty surely a kidney-stone in the substance of the kidney or in one of the calices.

At the present time (January 10th) you note that the patient, lying on the abdomen, shows an extensive necrotic area on the back. His face has a peculiar drawn appearance, the corners of the mouth being drawn into a typical risus sardonicus. There is some dyspnea and some difficulty in swallowing. The mouth can be opened about ½ inch and cannot be pried open further. The head is retracted and the neck rigid. The platysma muscle is tense There is rather marked rigidity of the abdominal and back muscles. The temperature is running about 100° F.

There can be no doubt that we have to deal with a case of tetanus. The maladies usually differentiated do not here come into consideration. Meningitis might simulate the condition, but the absence of mental disturbance speaks against it Trismus, usually the first symptom of tetanus, is rarely present early in meningitis. It is probable that the tetanus bacillus was introduced before the patient entered the hospital, making the period of incubation at least fifteen days This would seem to give a favorable prognosis if it were not for the extensive burn There have been other cases reported of tetanus developing in burns, but the combination must be rare. It is not difficult to see, however, that conditions for its development might be favorable in a burn with necrotic tissue which had been treated in a filthy manner.

In the treatment of developed tetanus recent workers advocate the early injection of moderate doses (5000 to 10,000 units) of antitetanic serum intravenously and intraspinally. On account of the extent of the burn in this case it has been considered unsafe to make the lumbar puncture, so we have decided to introduce the serum into the lateral ventricle, as advocated by Kocher.

OPERATION

After infiltrating the scalp with ½ per cent. novocain-adrenalin solution, an incision 2 inches long is made from the midline downward on a vertical line, passing just in front of the left external auditory meatus. A button of bone is then removed with a ⅜-inch trephine just to the left of the midline. The

dura is incised between two guy-rope sutures. A large vein is seen running across the center of the field in a sulcus. Wounding such a vessel would result in serious subdural hemorrhage, and is a strong argument against drilling the skull with blind puncture of the ventricle. The regular lumbar puncture needle is then introduced through the brain tissue to a depth of about 5 cm. straight into the ventricle. The cerebrospinal fluid does not begin to flow immediately, but after an interval begins to drop slowly from the needle. It is perfectly clear. In introducing the needle there is no feeling of lessened resistance as the ventricle is entered. The flow of cerebrospinal fluid from the lumen of the needle is the only sign that the ventricle has been entered.

After withdrawing a few cubic centimeters of fluid the serum is introduced by gravity, the container being connected with the needle by means of rubber tubing. It has required about twenty minutes to introduce 8000 units. The dura is closed with a catgut stitch and a button of bone of the inner table is replaced.

The patient states that he has felt no pain or discomfort during the procedure. It was noted, however, that he twitched several times. He will be kept on bromids and chloral, and tomorrow will be given another dose of antitetanic serum intravenously. We will not give magnesium sulphate further because of the danger to the respiratory centers.

SUBSEQUENT COURSE

January 11, 1917: Condition poor. Temperature 103.6° F. Talks irrationally. Generalized tremor. No convulsions. Pulse weak and rapid. Jaw, neck, and arms rigid. Great difficulty in swallowing. Rectal feeding.

January 12, 1917: Constant tremor; labored respirations. No definite convulsions. Unable to retain enemas. Trismus became more marked. Twitching became continuous, and patient finally became stuporous and died at 10 A. M., January 13th.

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